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BULLETIN No. 6.

U. S. DEPARTMENT OF AGRICULTURE.

DIVISION OF AGROSTOLOGY.

[Grass and Forage Plant Investigations.]

GRASSES AND FORAGE PLANTS

OF THE

DAKOTAS.

BY

THOMAS A. WILLIAMS.

PREPARED UNDER THE DIRECTION OF THE AGROSTOLOGIST.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1897.

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF AGROSTOLOGY,
Washington, D. C., December 8, 1896.

SIR: I have the honor to transmit for publication as Bulletin No. 6 of this Division a report upon the grasses and forage plants and forage conditions of the Dakotas, based upon the work of the field agents in those States during the past season and upon the observations made by Mr. T. A. Williams, assistant in the Division, who has compiled the report. Mr. Williams has spent several years in South Dakota and become personally familiar with much of the territory covered by the report. The grass and forage problem of both Dakotas is an exceedingly important one, and this report can not fail to be of great interest not only to the farmers and landowners of those States, but also to those living throughout a large portion of the Northwest where similar conditions prevail. The work in North Dakota was chiefly performed by Mr. M. A. Brannon, who visited various parts of the State under a commission from the Department, and whose notes and observations are scattered through various parts of the report. Messrs. E. N. Wilcox and David Griffiths assisted in the work done in South Dakota, Mr. Wilcox working under a commission for two months and Mr. Griffiths for a shorter period.

The report is divided into three parts, the first embracing general notes upon the forage conditions in the Dakotas; this is followed by an alphabetical and descriptive list of the grasses and forage plants of those States, in which are embodied notes of economic interest; the third part, which is addressed to botanists, contains a classified list of the grasses and forage plants collected or observed by the field agents and by Mr. Williams, specifying localities and introducing occasional notes of botanical interest.

Respectfully,

F. LAMSON-SCRIBNER,
Agrostologist.

Hon. CHAS. W. DABNEY, Jr.,
Assistant Secretary.

JAN 26 '39

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GRASSES AND FORAGE PLANTS OF THE DAKOTAS.

GENERAL NOTES ON THE FORAGE CONDITIONS IN THE DAKOTAS.¹

FEATURES OF THE FARMING AND STOCK-RAISING REGIONS.

The distinctively farming and stock-raising regions of the Dakotas are separated by more or less widely differing geological and meteorological conditions. In North Dakota the lands drained by the Red River of the North, the James River, and the Turtle Mountain slope of Mouse River are especially adapted to general agriculture. The rainfall, temperature, and character of the soil make this whole district peculiarly favorable to the growth of small grains.

These lands include about one-third of the entire State, and are given over chiefly to the growing of wheat, though other small grains are grown in large quantities. Nearly all varieties of flint corn and the early varieties of dent do well in this region, and many varieties which will not ripen seed on account of the shortness of the season can be profitably grown for forage. The straw from the fields of wheat and other small grains furnishes an almost inexhaustible supply of "roughness" for stock feeding. Root crops are easily grown, and are fed with the straw and the various by-products of small grain to a great advantage.

In South Dakota the lands adapted to general agriculture are those drained by the Sioux and James rivers, those of the Big Stone Basin, the lower Missouri Valley, and the rich valleys of the Black Hills region.

While, as with North Dakota, a considerable portion of these lands is devoted chiefly to wheat raising, many of them are well adapted to the growing of corn, flax, and other crops, and diversified farming is becoming more and more popular each year. Excellent crops of corn are grown in the lower Missouri Valley, the Sioux Valley, and the Big Stone Basin.

During the past few years a great many creameries have been established in various parts of the State, and this industry is being carried on with a high degree of success. The excellent quality of the native forage enables the creameries to send out such a fine product that Dakota butter is becoming famous and commands high prices in the markets.

¹ What is said here will apply to southwestern Minnesota, northwestern Nebraska, eastern Montana, and northeastern Wyoming.

THE NATIVE GRASSES.

As a consequence of the extensive breaking up of the virgin soil in the agricultural regions, many of the native grasses have been restricted to limited areas, which are usually too broken or too wet for cultivation. The principal native hay grasses are Big Blue-stem, Bushy Blue-stem, Switch-grass, Western Wheat-grass, Western Quack-grass, Slender Wheat-grass, Fowl Meadow-grass, Cord-grass, Wild-rye, the Blue-joints, and the various species of *Stipa*, while these grasses, with the Gramas, Buffalo-grass and Prairie June-grass, furnish most of the grazing.

With the exception of the Black Hills region of South Dakota, the immense tract of land west of the one hundred and first meridian to the Rocky Mountains is devoted almost exclusively to stock raising. In each of the Dakotas it includes two regions of very different character; one consisting of a broad rolling prairie known as the "range" and the other the famous Bad Lands. The latter region consists of a wide area of land broken up by excessive erosion into valleys and basins of various sizes alternating with hills or buttes, the sides of which are usually so steep and so unstable that few plants can grow upon them. The flat tops of the buttes and the bottoms of the valleys and basins are usually covered with a characteristic growth of vegetation of which the grasses form by far the greater part.

The principal grasses of the stock-raising regions are the Gramas, Buffalo-grass, Salt-grass, the Blue-joints, the Sand-grasses, Western Wheat-grass, Western Quack-grass, Needle-grass, and Feather Bunch-grass. Western Wheat-grass and Western Quack-grass furnish most of the hay, except in the moister bottoms, where the Blue-joints, Big Sand-grass, and the Cord-grasses are more or less abundant.

Overpasturing in times of drought is killing out many of the most valuable grasses here as well as elsewhere, and unless this practice is abandoned permanent injury will result to this, one of the most important of the natural resources of the Northwest.

The great value of this natural forage is evident when we look at the freight records of the various railroads and see the thousands of carloads of stock annually shipped from this region which are produced with no other feed than that growing naturally on the prairies. From Dickinson alone there were shipped 2,300 carloads off at cattle within ninety days during the summer and early autumn of 1895.

It is very important that every possible effort should be made to preserve the native grasses. They are naturally adapted to the conditions which prevail in the region, and it is quite improbable that introduced forms can be had to take their places satisfactorily, at least for years to come. "That some of the native forms flourish under conditions that would kill the common cultivated ones is seen by the situation in Stark County, N. Dak. At Dickinson, the Weather Bureau reports for 1895 show a rainfall of 11.75 inches. Of this amount 5.75 inches fell in June and July. The small precipitation of 0.64 inch in the three months

of August, September, and October favors the important process of curing on the ground. This enables thousands of cattle to live during the winter on the nutritious forage furnished by this method of curing the grasses which grow at this point" (Brannon). Such a climatic condition would soon destroy the ordinary cultivated grasses, but the native species have flourished under it for centuries, and there is no reason why they should not continue to do so and still yield plenty of forage, if properly handled.

THE IRRIGATION PROBLEM.

"The successful solution of the irrigation problem in the Dakotas would be of great value to the grazing as well as to the farming interests. In North Dakota an abundance of good artesian water can be secured by boring from 90 to 260 feet at many places in the eastern part of the State, but in the middle and western portions the artesian supply is to be found from 1,000 to 3,000 feet below the surface, and can not be certainly secured at even 3,000 feet in many places. There is considerable hope of irrigating successfully from surface wells from 30 to 90 feet deep which afford a large supply of good water. These wells may be operated by windmills at small expense" (Brannon). One of the most serious difficulties in the way of successful irrigation is a lack of sufficient capital on the part of the farm owners to put down good wells, build ditches and reservoirs, and keep up other necessary expenses until the farm is placed upon a paying basis. Another trouble is the lack of proper experience in handling the water after it is ready to turn on the land.

Experience has shown that many of the most valuable of the native grasses are very much benefited by a judicious application of even a small amount of water. As a rule there is sufficient rainfall to give the grasses a good start in the spring, and if enough water could be had to keep up a strong growth when the dry, hot summer weather comes on, an abundant forage crop would be assured.

In South Dakota, flowing wells can be had at varying depths throughout the James Valley, a portion of the Missouri Valley and of the Big Stone Basin. That excellent crops can be grown under irrigation from these wells is being proved by the State experiment station on the Hunter farm at Mellette, as well as by many private individuals in various parts of the artesian regions.

CONDITIONS IN THE ARTESIAN BASIN.

The following, taken from Mr. Wilcox's report, gives an account of the forage conditions in the artesian basin:

On the 17th of August I left Brookings County and went west into the artesian basin of the James River Valley, stopping first at Iroquois. The country from Brookings to Iroquois is a rolling prairie. The principal grasses are Little Blue-stem, Big Blue-stem, Western Wheat-grass, Porcupine-grass, Switch-grass, Big Sand-grass,

Wild-rye, and Spiked Muhlenberg's-grass. Along the artesian well drain at Iroquois *Sporobolus asperifolius*, Salt-grass, Western Wheat-grass, Wild-rye, Switch-grass, Cord-grass, Tall Grama, and very large specimens of Barnyard-grass abound. Blue Grama and Buffalo-grass are common on the prairies.

From Iroquois south to Vilas there is no perceptible difference in the flora.

From Vilas I went westward through Miner and Sanborn counties, and into north-western Aurora County. Near Artesian City, in Miner County, I crossed a large "Gumbo flat," on which little grew except Salt-grass, Saltbushes, and Western Seablight (*Suaeda depressa*). At Artesian City water is obtained at less than 100 feet, and the wells have been flowing for eight or nine years. The ordinary prairie grasses were common, and Slough-grass (*Beckmannia erucaeformis*), was beginning to appear in the ditches and ponds.

From Artesian City westward the country grows drier and drier, except a strip of 10 or 12 miles on each side of the James River. Where I crossed the river near Forestburg, a herd of about 400 cattle had been pastured and were in fine condition.

The pasture was composed of native grasses. Big Sand-grass, Switch-grass, Tall Grama, Blue Grama, Western Wheat-grass, and Wild Vetch (*Hosackia purshiana*) grew in large quantities, but had all been fed close to the ground. The only plants which did not seem to have been eaten were *Cleome integrifolia* and several species of Golden Rod. There were acres of the *Cleome*, and the masses of rose purple flowers were a beautiful sight.

At Woonsocket several large artesian ponds had been drained and the vegetation cut for hay, but it did not seem to be of much value, as it was largely made up of species of *Bidens*, *Eleocharis*, and *Scirpus*. Barnyard-grass made the most valuable part of the hay.

At Letcher there were several large ponds fed by the artesian well. On the margins of these ponds were growing Reed-grass, Slough-grass, Barnyard-grass, Switch-grass, Long-leaved Prairie-grass, Cord-grass, and sparingly, Rice Cut-grass (*Homalocenchrus oryzoides*).

From Letcher westward Long-leaved Prairie-grass, Southern Poverty-grass, *Sporobolus brevifolius*, and *S. cryptandrus* became more and more common. Buffalo-grass grew in considerable quantity; Wild Crab-grass was occasionally seen, and also the low-growing Cacti (*Mamillaria vivipara*, *M. missouriensis*, and *Opuntia fragilis*). The grasses seemed to gradually decrease in size, and a relatively larger amount of seed was produced by each species than farther eastward, although, owing to dry weather, much of the seed did not mature.

Northern Aurora County is in the western part of the James River Valley close to the Wessington Hills, which divide the small streams flowing into the James River from those flowing into the Missouri. For nine or ten years the rainfall here has been scanty and much of the land has, to use the local expression, "gone back," i. e., been broken up and cultivated for two or three years, then deserted and allowed to grow up to grass and weeds. This would make better hay-land if the Russian Thistle and Gum Weed (*Grindelia squarrosa*) were not present in such large quantities. The latter weed is spreading over the whole country, prairies, pastures, and all uncultivated land. The woody, sticky stems cause considerable trouble in haying season, but are worst in the pastures, where the resinous exudation sticks to the faces of cattle, horses, and sheep, causing eyes and nostrils to become inflamed and sore. The plant has the one redeeming feature of being good to burn, and is being collected in considerable quantity for winter fuel.

The Wessington Hills have an elevation of two or three hundred feet above the surrounding country. There were formerly many small lakes among these hills, but they are now nearly all dry. The Firesteel Creek heads in the Wessington Hills, and runs southeast about 50 miles, where it enters the James River near Mitchell. Along the banks of the Firesteel grow *Petalostemon violaceus*, *P. candidus*, *P. multiflorus*, *Amorpha canescens*, *A. microphylla*, *Psoralea argophylla*, *P. esculenta*, *Astragalus caryocarpus*, *A. plattensis*, *A. adurgens*, *A. racemosus*, *A. lotiflorus*, *A. missouriensis*, *A. canadensis*, *Oxytropis lambertii*, *Glycyrrhiza lepidota*, and such grasses as Big Blue-stem,

Little Blue-stem, Bushy Blue-stem, Tall Grama, Blue Grama, Long-leaved Prairie-grass, Southern Poverty-grass, Switch-grass, Western Beard-grass, Wild-rye, Lyme-grass, Western Wheat-grass, Spiked Muhlenberg's-grass, Mexican Wood-grass, Slender Wheat-grass, Buffalo-grass, Cord-grass, Big Sand-grass, Montana Sand-grass, *Sporobolus brevifolius*, *Panicum depauperatum*, and *Homalocenchrus virginicus*.

In the dry sloughs of the prairie, grow Blue-joint, Reed Canary-grass, Cord-grass, and Switch-grass.

In the "burn outs," "blow outs," or "buffalo wallows" grow *Sporobolus cryptandrus*, *Leptochloa fascicularis*, Salt-grass, Long-leaved Prairie-grass, Buffalo-grass, *Atriplex argenteum*, *Plantago patagonica*, vars. *gnaphalioides* and *nuda*, *P. pusilla*, and *Marsilea vestita*. As the "buffalo wallows" require much work and time to make them productive when cultivated, they are usually pastured. All the above-mentioned plants are eaten by stock.

One of the farmers here had about a quarter of an acre of Smooth Brome-grass grown from seed sent out for trial by the State experiment station. The grass was growing well and maturing a good crop of seed. In the town of Plankinton was a small field of Timothy and Red Clover which had been watered thoroughly during the dry weather. When I saw it about the middle of August, one fine crop of early hay had been cut and a second, heavier crop, was just being gathered.

The artesian ponds at Plankinton contained *Typha latifolia*, *Sparganium eurycarpum*, *Scirpus robustus*, *S. lacustris*, *S. fluviatilis*, *Leptochloa fascicularis*, *Beckmannia erucaeformis*, *Calamagrostis canadensis*, and *Spartina cynosuroides*, while on the margins grew Big Blue-stem, Barnyard-grass, Switch-grass, Long-leaved Prairie-grass, Wild-rye, Tall Grama, Western Wheat-grass, and Squirrel-tail-grass.

In concluding this part of my report I might say that the most interesting things which I have observed were the climatic differences which occurred in traveling a distance of only 100 miles, the corresponding effects of these changes on the flora of the regions visited, and, in the drier parts of the State, the marked influence of irrigation on all kinds of vegetation.

In the eastern part of the State good crops are nearly always secured, but owing to the low price of grain, farmers are largely going into dairying. In this section it costs from 75 cents to \$1.25 per month to pasture cattle and horses. The winters are nearly always snowy and stock must be stabled and fed for a long time.

In northern Aurora County, where for some time there has been so little rain that farmers have secured a good crop only once in four or five years unless they irrigated, horses and cattle are pastured from May to November for \$2 per head. There is very little snow in winter, and cattle and horses live upon the open prairies. I saw numbers of young well-bred horses which were in fine condition and yet had been fed neither hay nor grain, nor had they been stabled for over two years. Cattle were fatter than any I saw in Iowa or Illinois, although the prairie grass looked scorched and dry.

In general, irrigated plants are larger, they grow and remain green for a longer period of time, and relatively they produce much less seed in proportion to the stems and leaves than plants of the same species and locality under natural conditions. There is a belt of green vegetation around artesian ponds and ditches long after the plants on the prairies are dry and yellow.

I gathered mature seeds of *Beckmannia erucaeformis* at Brookings before the middle of July, and four weeks later at the artesian well at Plankinton, this grass was seen in bloom.

The following forage plants are common about artesian wells: *Typha latifolia*, *Sparganium eurycarpum*, *Scirpus lacustris*, *Scirpus fluviatilis*, *Scirpus robustus*, *Carex douglasii*, *Carex straminea*, *Spartina cynosuroides*, *Phragmites vulgaris*, *Distichlis spicata striata*, *Leptochloa fascicularis*, *Sporobolus longifolius*, *Panicum virgatum*, *Panicum crus-galli*, *Hordeum jubatum*, *Chaetochloa glauca*.

Until recent years there was little need in either of the Dakotas of growing tame grasses, and, as is always the case, many of the first

attempts in this direction met with failure or only indifferent success. However, as the farmers are becoming more acquainted with the peculiarities of soil and climate existing in this region, better results are being obtained, and at the present time in many parts of both North Dakota and South Dakota may be found excellent pastures and meadows of tame grasses. In the rich bottom lands in the older settled regions Timothy, Red-top, Alsike, Red Clover, White Clover, Smooth Brome-grass, Blue-grass, and several of the fescues give paying crops. Millet is extensively grown in all the farming communities, and such recent introductions as Kaffir Corn, Lupines, and Sand-vetch seem likely to assume an important place among the forage crops of this region, already so bountifully supplied by nature with the "grasses of the field."

Wherever irrigation is practiced there is no difficulty in getting paying crops of such grasses as Timothy and Red-top, and it is quite certain that many other forage plants can be successfully grown in the artesian regions when the vast underground water supply can be utilized.

GRASSES AND OTHER PLANTS OF THE DAKOTAS WHICH ARE OR MAY BE OF IMPORTANCE AS FORAGE.

Agropyron.

Of the several species of *Agropyron*, or Wheat-grasses, growing in the Dakotas, Western Wheat-grass (*Agropyron spicatum*) is the most common and the most valuable. Western Quack-grass (*A. pseudorepens*) and Slender Wheat-grass (*A. tenerum*) (fig. 1) are also valuable, but are less abundant in the dry regions than Western Wheat-grass. These *Agropyrons* are plentiful both on the "range" and in the agricultural regions, and are highly valued for both hay and pasturage. They grow voluntarily on old plowings, and instead of attempting to destroy the plants, which would be difficult on account of the numerous underground stems, or rhizomes, many farmers prefer to leave such lands for meadows. The yield of hay is usually much better than on the unbroken prairie. In favorable seasons three tons per acre are often obtained from these meadows. Wheat-grass hay is one of the most nutritious grown in the Northwest. Under ordinary circumstances a Wheat-grass meadow will not give a good crop every year; usually the yield is light the third year. Many farmers overcome this trouble by harrowing or discing the meadow, which breaks up the underground stems of the grass, and a fine growth of new shoots is the result. The Wheat-grasses cure on the ground in the grazing regions and furnish a large amount of very nutritious forage during the winter. From the middle of July there is little rain in the western cattle districts, and these grasses mature early and are the chief forage plants on which thrive the choice beeves, which command fancy prices in the eastern markets. They have few equals among the grasses of the western prairies in the quantity or quality of forage produced, and should be cultivated and improved as much as possible.

Agropyron caninum. (See Bearded Wheat-grass.)

Agropyron divergens. (See Bunch Wheat-grass.)

Agropyron pseudorepens. (See Western Quack-grass and *Agropyron*.)

Agropyron richardsoni. (See Bearded Wheat-grass.)

Agropyron spicatum. (See *Agropyron*.)

Agropyron tenerum. (See *Agropyron* and Slender Wheat-grass.)

Agrostis scabra. (See Tickle-grass.)

Alfalfa (*Medicago sativa*).

This plant is grown in many parts of both Dakotas, but generally with indifferent success. Where irrigation is possible, better results are had. No difficulty is experienced in getting a good stand, but too often the season is unfavorable for the rapid development so necessary to the successful growing of this crop. The plants turn yellow and the first cutting is light. Where the field can be irrigated immediately on the taking off of the first crop, this trouble is not so serious. The plants are often badly affected by a fungous disease which causes the leaves to fall early, and thus much of the most valuable part of the forage is lost.

Alopecurus geniculatus fulvus. (See Wild Water Foxtail.)

Alsike (*Trifolium hybridum*).

This clover occurs in door yards, along roadsides, and occasionally in fields in the valleys of the Red, James, and Sioux rivers. It does well in the eastern part of South Dakota, and Professor Brannon, speaking of it in the Red River Valley in North Dakota, says "it seems to be quite hardy and would no doubt do well sown with Timothy, Orchard-grass, or Kentucky Blue-grass."

American Vetch (*Vicia americana*).

More or less abundant in the eastern part of both States, where it grows in moist places. "It is relished by all kinds of stock and furnishes considerable food," which is "considered very fattening."

Andropogon hallii. (See Colorado Sand-grass.)

Andropogon nutans. (See Bushy Blue-stem.)

Andropogon provincialis. (See Big Blue-stem.)

Andropogon scoparius. (See Little Blue-stem.)

Aristida fascicularis. (See Western Beard-grass.)

Arrhenatherum elatius. (See Tall Oat-grass.)

Astragalus.

There are a large number of species belonging to this genus found in the Northwest. Some of them are readily eaten by stock and are highly prized by stockmen; others are so bitter and unpalatable that few animals will touch them, while still others are thought to be injurious.

Astragalus adsurgens. (See fig. 6.)

This species is said to be eaten readily by stock, particularly on the "range," when grasses are dry and short. This, and other small-fruited species, are known as Milk Vetch.

Astragalus bisulcatus.

One of the strong smelling species. "The plant has a rather rank taste when young, but loses this as it becomes mature, when stock readily eat both stems and leaves" (Brannon).



FIG. 1.—Slender Wheat-grass (*Agropyron tenerum*).

Astragalus caryocarpus. (*See Buffalo Pea.*)

Astragalus canadensis.

A coarse-growing species seldom eaten by stock of any kind.

Astragalus flexuosus.

In this species the stems become woody so early that it has little, if any, value as a forage plant.

Astragalus hypoglottis.

This small Milk Vetch is very abundant on our Northwestern prairies. It is relished by stock and furnishes no inconsiderable amount of forage in many localities. No good common name has as yet been given to this species. Bristly-fruited Milk Vetch would suit it very well.



FIG. 2.—Barnyard-grass (*Panicum crus-galli*).

artesian wells. It seems probable that it could be cultivated to advantage in the artesian basin, and it should be given an extended trial (fig. 2).

Bearded Wheat-grass (*Agropyron richardsoni* and *A. caninum*).

These species are much more valuable for hay than for grazing, as they fruit early and produce very little growth during the remainder of the season.

Beckmannia erucæformis. (*See Slough-grass.*)

Beckwith's Clover (*Trifolium beckwithii*).

This pretty little clover is quite abundant in the upper Sioux Valley, but only in a rather limited area, and it has not been reported from any other locality in the middle Northwest. It grows in rather moist prairie meadows and along the margins of swales. In the vicinity of Brookings, S. Dak., it is very plentiful and forms an important element in the native pasturage. It may prove valuable under cultivation.

Big Blue-stem (*Andropogon provincialis*).

This is the most common blue-stem in this region. It is everywhere regarded as one

Astragalus plattensis. (*See Buffalo Pea.*)

Atriplex spp. (*See Salt-bushes.*)

Avena fatua. (*See Wild-oats.*)

Avena americana. (*See Native Meadow Oat-grass.*)

Barnyard-grass (*Panicum crus-galli*).

Found more or less abundantly throughout the Northwest in fields and waste places. It makes an immense growth in rich moist soils. All kinds of stock eat it readily, either in the green state or as hay. The hay is coarse and should be cut before the stems become woody. It is becoming very abundant on waste irrigated lands, where it often reaches a height of from 4 to 6 feet. At Redfield, Iroquois, Letcher, and elsewhere in the James Valley it is one of the most conspicuous plants along ditches and about ponds fed by

of the most valuable of the native grasses. Though it occurs in greater or less abundance on the prairies, it reaches its best development in the moist bottom lands along streams and in the lake regions. In the Sioux Valley, Red River Valley, Big Stone Basin, and lower Missouri Valley this is the most highly prized hay grass of all the native species. It is becoming more abundant as the country is settled up, and prairie fires are better controlled and the meadows given better care.

Big Sand-grass (*Calamovilfa longifolia*).

This is one of the most widely distributed grasses on the Northwest prairies. It prefers sandy soils in rather moist localities. It is one of the most conspicuous grasses of the moist runs and sandy basins of the Bad Lands, and affords a considerable amount of coarse hay. Its rigid leaves and strong-growing rootstocks make it an excellent sand binder.

Black Grama (*Bouteloua hirsuta*).

This is often found in company with Blue Grama, but is much less common and of less importance agriculturally.

Blow-out grass (*Muhlenbergia pungens*).

This grass is apparently rare, and is of little value for forage, as stock seldom eat it, on account of its rigid, pointed leaves. It grows about "blow-outs," in dry, sandy soil, and is of considerable value as a sand binder.

Blue-eyed grass (*Sisyrinchium angustifolium*).

This is a small grass-like plant belonging to the Iris family, and is quite abundant in the eastern part of both States. It forms clusters of leaves and stems, which are liked by all kinds of stock.

Blue Grama (*Bouteloua oligostachya*).

This is the most common grama in the Northwest. It is very abundant on the ranges, and ranks among the most important plants for grazing purposes in those regions. It "sun cures," and not only serves for forage in summer and fall, but continues to be one of the main food supplies in winter. Together with Black Grama, it is often called "Buffalo-grass." Cattlemen hold both grasses in high esteem (fig. 3).

Blue-joint (*Calamagrostis canadensis* and *C. scribneri*).

The Blue-joints are abundant throughout in moist meadows and pastures. They produce an excellent growth of root leaves, and hence are heavy yielders. The hay, though often coarse, is almost equal to Timothy in nutritive qualities.

Bog-rush (*Juncus* spp.).

Several species of Bog-rush occur in greater or less abundance. All are eaten by stock to some extent, and they usually form a small part of the hay obtained from low boggy places.

Bouteloua hirsuta. (See Black Grama.)

Bouteloua oligostachya. (See Blue Grama.)

Bouteloua racemosa. (See Tall Grama.)



FIG. 3.—Blue Grama (*Bouteloua oligostachya*).

Bromus ciliatus. (See Swamp-chess.)

Bromus inermis. (See Smooth Brome-grass.)

Bromus kalmii. (See Kalm's Chess.)

Broom-corn Millet (*Panicum miliaceum*).

This millet is quite extensively cultivated throughout the Northwest and is especially valuable because of the short season which it needs to reach maturity and because of the large yield of seed. As a hay plant it is much less valuable than the common millet. The seed has been used to very good advantage for fattening hogs and feeding other farm animals. In some parts of the Northwest it is known as Hog Millet. Enormous yields of seed have been obtained in the eastern parts of the Dakotas. The seed is fed to best advantage when crushed or ground and it is often soaked for hogs. Though it is not the equal of corn as a food for fattening animals it may, under certain circumstances, very well take the place of it. The plant stands drouth well, grows rapidly, and makes an excellent catch crop.

Buffalo Pea (*Astragalus caryocarpus* and *A. plattensis*).

These plants are more or less abundant on dry prairies throughout the whole Northwest. *Astragalus caryocarpus* is by far the commonest of the Buffalo Peas.

It is eaten by cattle and sheep, and the latter are said to be particularly fond of the fleshy plum-like peapods. These pods are also sometimes used as an article of human diet.



FIG. 4.—Buffalo-grass (*Bulbilis dactyloides*).

Buffalo-grass (*Bulbilis dactyloides*).

This famous range grass is still quite abundant in the regions west of the James Valley in both Dakotas. It is by no means as rare as most people suppose, being frequently overlooked on account of its similarity to certain of the grama-grasses and because it seldom fruits in any great quantity. The dense mats formed by its curly leaves and creeping stems may be distinguished from the surrounding vegetation on account of their paler color. Stock are very fond of this

grass, and especially in winter prefer it to any other native forage (fig. 4).

Bunch Wheat-grass (*Agropyron divergens*).

"A bunch grass of the Bad Lands. It furnishes a large amount of excellent forage. The leaves remain green long after the flowering season and are much relished by all kinds of stock" (Brannon).

Bushy Blue-stem (*Andropogon nutans*).

This grass is scarcely less valuable than Big Blue-stem. It thrives on rather drier soil than that species, and, like it, is becoming more abundant every year.

Calamovilfa longifolia. (See Big Sand-grass.)

Calamagrostis americana.

This grass is very common in moist meadows, particularly where the soil is sandy, and "affords a large amount of excellent hay," if cut in proper season. It is called "Sand-grass" and "Yellow-top" in some parts of the Northwest.

Calamagrostis canadensis. (See Blue-joint.)

Calamagrostis montanensis. (See Montana Sand-grass.)

Calamagrostis scribneri. (See Blue-joint.)

Carex spp. (*See Sedges.*)

Cenchrus tribuloides. (*See Sand-bur.*)

Chætochloa glauca. (*See Yellow Foxtail.*)

Chætochloa italica. (*See Millet.*)

Chætochloa viridis. (*See Green Foxtail.*)

Colorado Sand-grass (*Andropogon hallii*).

This is very much like Big Blue-stem in appearance, but is probably less valuable for forage. It grows in sandy soils, and, because of its stout rootstocks, which are often several feet in length, it is a good sand binder.

Cord-grass (*Spartina cynosuroides*).

A common grass in sloughs and wet places throughout the Northwest. It, together with certain rushes and sedges, makes up the greater part of the early hay cut in this region. The hay is coarse but nutritious, and is relished by stock. "The stems contain considerable sugar, and are eaten readily by stock" if the hay has been cut before they become too tough and woody. It is extensively used as a thatch for roofs of sheds and stables, and also for fuel. When made into firm "twists," it makes a fair substitute for wood, and often is one of the principal sources of warmth for people who through lack of funds or in times of scarcity can not get a sufficient supply of wood and coal.

Cow Pea (*Vigna catjang*).

Occasional under cultivation. At Brookings and Mellette, S. Dak., this plant made an excellent growth the past season, but failed to ripen seeds. It may prove to be a good plant for soiling purposes.

Cyperus spp.

There are several species of this genus which enter more or less into the native forage supply of this region. They grow in wet soil, and seldom occur in very great quantity. *Cyperus erythrorhizos* and *C. speciosus* are the most important species as far as the forage question is concerned.

Cyperus schweinitzii.

This sand-loving cyperus is probably of little importance as a forage plant, except, perhaps, in the sandy bottoms along streams or lakes. "Its chief use is for holding the sand and preventing the drifting, which is excessive in some localities" (Brannon).

Dactylis glomerata. (*See Orchard-grass.*)

Dalea alopecuroides.

This leguminous plant is quite abundant in the lower Missouri Valley region. It prefers dry sandy soils, and yields considerable forage, which stock eat quite readily. In some localities it is highly prized by stockmen.

Deschampsia cæspitosa. (*See Tufted Hair-grass.*)

Desmodium canadense.

This is a common plant in low pastures and along the borders of woods. It grows 3 to 5 feet high, and produces a large number of leaves, which are relished by cattle and sheep. It goes by the name of "Meadow trefoil" or "Stick-seed."

Distichlis spicata stricta. (*See Salt-grass.*)

Early Bunch-grass (*Eatonia obtusata*).

This is an excellent pasture grass because of its earliness and of the fine quality of the forage produced. It is not often present in any great quantity, however, but is most abundant in the moister regions, where it is much prized as an early pasture grass.

Eatonia nitida. (*See Short-leaved Eatonia.*)

Eatonia pennsylvanica.

This grass flourishes in moist meadows and open woods, but forms too small a part of the forage to be of much importance for either pasturage or hay. Like early bunch grass, however, the forage is of excellent quality.

Eleocharis spp. (*See Spike-rush.*)

Elymus canadensis. (*See Wild-rye.*)

Elymus macounii. (*Macoun's Wild-rye.*)

Elymus virginicus. (*See Lyme-grass.*)

Eragrostis major. (*See Stink-grass.*)

Eragrostis purshii. (*See Southern Spear-grass.*)

Eriocoma cuspidata. (*See Indian Millet.*)

Eurotia lanata. (*See Winter Fat.*)

False Buffalo-grass (*Munroa squarrosa*).

A low-growing grass of dry, sandy soils. Stock seldom eat it on account of its harsh stems and rigid, pointed leaves. It is said that the agricultural ants collect the seeds of this grass for their store of winter food.

False Redtop. (*See Poa flava and Panicum virgatum.*)

Feather Bunch-grass (*Stipa viridula*).

Very abundant in dry, sandy soils, furnishing a large amount of forage. The "spears" of this grass are not so injurious as are those of the other two species of *Stipa* occurring in the Dakotas.

Festuca elatior. (*See Tall Fescue.*)

Festuca elatior pratensis. (*See Meadow Fescue.*)

Festuca octoflora. (*See Slender Fescue.*)

Festuca ovina. (*See Sheep's Fescue.*)

Fine-topped Salt-grass (*Sporobolus asperifolius*).

More or less abundant in saline soils in the western part of the Dakotas. Cattle are not very fond of it, but will eat it when other forage is scarce, and as it thrives on soils that will grow but few other grasses it may be valuable in some localities.

Floating Meadow Foxtail. (*See Wild Water Foxtail.*)

Fowl Meadow-grass (*Poa flava*).

This is one of the most valuable of the native species of *Poa*. It occurs in both dry and moist soils, but reaches its best development in the latter. In many localities in the eastern part of both States it furnishes a large portion of the forage. It is particularly valuable on lowland meadows that are occasionally overflowed. In the Sioux Valley at Brookings, S. Dak., this grass sometimes furnishes 50 per cent of the hay cut from the meadows near the river.

Glyceria airoides.

Grows in old lake beds and in sandy alkaline basins. It is most abundant in the Bad Lands. In the latter region it often furnishes considerable forage.

Glyceria aquatica. (*See Reed Meadow-grass.*)

Glyceria fluitans. (*Floating Manna-grass.*)

Glyceria nervata. (*See Nerved Manna-grass.*)

Great Bulrush (*Scirpus lacustris*).

Though sometimes eaten by stock, this plant is of little importance for forage, unless perhaps, in very marshy land.

Green Foxtail (*Chatochloa viridis*).

A weedy grass, becoming more or less abundant in cultivated lands. "It grows luxuriantly on rich ground, and may be used for hay with profit if cut early." Screenings composed largely of the seeds of this and other Foxtails are often fed to calves and poultry with most excellent results.

Hairy Vetch (*Vicia villosa*). (*See Sand Vetch.*)

Holy Grass. (*See Sweet-grass.*)

Hordeum jubatum. (*See Squirrel-tail.*)

Hordeum nodosum. (*See Wild Barley.*)

Hosackia purshiana. (*See Wild Vetch.*)

Hungarian Grass (*Chatochloa italica germanica*).
(*See Millet.*)

Indian Millet (*Eriocoma cuspidata*).

This is one of the bunch-grasses of the Bad Lands, where it is regarded as a good forage plant. After fruiting, the stems and leaves become hard and woody and then are not much eaten by stock unless better forage is scarce. However, stock are very fond of the ripened seeds, which are said to be very nourishing. It usually occurs in sterile, broken soil where but few other grasses will grow.

Indian Rice (*Zizania aquatica*).

This grass is quite plentiful in running water throughout the region east of the Missouri River. It is often so abundant in the Sioux River as to cover the entire bed of the stream for long distances. All kinds of stock eat it with relish, and cattle and horses will wade out into the water and bite off the grass down to the surface of the water. In dry seasons when the water is low the grass is cut and used for fodder. The seeds are a favorite article of food of the Indians, and are also often used by the white settlers. During their fall migrations the wild fowl come to the rice-filled streams by thousands, for they are very fond of the seeds of this grass. It is a valuable plant for use in seeding down the waters of game preserves (fig. 5).

Juncus spp. (*See Bog-rush.*)

Kaffir Corn (*Andropogon sorghum* var.).

This forage plant has received considerable attention in the Dakotas during the last few years. The chief obstacles in the way of its culture have been the cold, often late springs, which kept the plants from making sufficient growth to allow the cultivation necessary to keep the weeds in check, and the short seasons, which do not allow many of the varieties to ripen seed. However, many farmers have succeeded in growing the hardier varieties with excellent results, and it is not unlikely that Kaffir Corn may soon become one of the principal



FIG. 5.—Indian Rice (*Zizania aquatica*).

sources of the supply of coarse forage for this region. Both red and white varieties were grown very successfully on the Hunter farm at Mellette, S. Dak., the past season, as also on the station farm at Brookings, and farmers from various parts of both States give very encouraging reports of their attempts to grow this crop.

Kalm's Chess (*Bromus kalmii*).

Usually too rare to be of much importance as a forage plant. It grows in dry, open woodlands and, so far, has been found to be most abundant in the Turtle Mountain region.

Kentucky Blue-grass (*Poa pratensis*).

This grass is pretty generally distributed over the eastern portion of both Dakotas, either in the wild or in the cultivated state. "It makes the best development in rich moist meadow lands, where it yields well in both hay and pasturage. It matures early and does well when mixed with other grasses, and hence is valued for upland pastures." It is an excellent grass for use in reseeding worn-out places in the native pastures. The dry weather of midsummer often causes it to dry up considerably, but stock like it even in that condition. It starts early and also makes a good growth after the September rains, and hence forms an important element in the forage of the season.

Koeleria cristata. (See *Prairie June-grass*.)

Lathyrus palustris. (See *Native Meadow Pea*.)

Lathyrus venosus.

A very pretty native pea growing on shaded banks, said to be "eaten greedily by cattle and hogs."

Little Blue-stem (*Andropogon scoparius*).

This blue-stem is found throughout the Northwest on dry prairies and hillsides. Early in the season it is eaten by stock, but it soon becomes so tough and woody that the animals will not eat it unless forced to do so. The dense clusters of woody stems are very difficult to cut, and will almost ruin an ordinary mower if much of the grass is present in the hay meadow. In the Bad Land "basins" it is the most conspicuous grass seen, and forms very dense bunches of tough, wiry stems seldom eaten by cattle or horses.

Long-leaved Prairie-grass (*Sporobolus longifolius*).

More or less abundant in rather dry, sandy meadows and along hillsides and edges of fields. It yields a large amount of forage, which is eaten by stock while young and fresh or when properly cut and cured. Late in the season it develops so much woody tissue in the stems and leaves that neither cattle nor horses will eat it unless forage is scarce. It is possible that the plant could be utilized in the manufacture of paper, mats, etc., as the leaves are long and contain such an abundance of fibrous tissue. The grass flourishes in the vicinity of the waste water from artesian wells.

Lyme-grass (*Elymus virginicus*).

More or less abundant in open woods and dry meadows. It is an excellent grass for early pasturage, and also furnishes a considerable amount of hay in certain localities. It is frequently badly affected with ergot, and then the hay is injurious to stock unless cut early. In the lower Sioux and Missouri valleys this grass, together with Wild-rye (*Elymus canadensis*), furnishes much of the forage in woodland pastures.

Meadow Fescue (*Festuca elatior pratensis*).

This fescue has given better results than any other large fescue tried in the Northwest. It thrives best on rich, moist bottom lands, and is an excellent grass for mixtures for permanent meadows and pastures. It does not succeed well on dry upland or sandy soils, but can be used to advantage in seeding down sloughs or lake beds that have been drained.

Meadow-rush (*Scirpus atrovirens* and var. *pallidus*).

Wet sloughs. It is readily eaten by stock and occasionally occurs in considerable quantity in "Slough-grass hay."

Meadow Trefoil. (See *Desmodium canadense*.)**Medicago sativa**. (See Alfalfa.)**Melica hallii**.

A fescue-like grass found on dry rolling prairies. Probably of little importance as a forage.

Melilotus alba. (See White Sweet Clover.)**Mesquite**. (See *Bouteloua* spp.)**Mexican Wood-grass** (*Muhlenbergia mexicana*).

A common grass in moist soil in open woods and thickets. It yields considerable forage, which is very nutritious, and in certain localities is of some importance in woodland pastures.

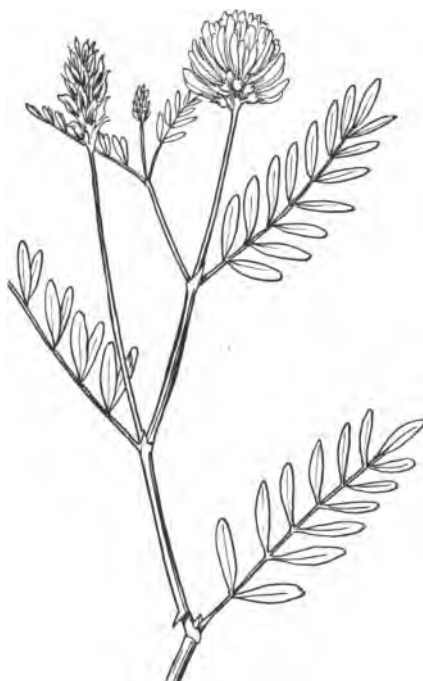
Milk Vetch (fig. 6). (See *Astragalus adsurgens*.)

FIG. 6.—Milk Vetch (*Astragalus adsurgens*).

Millet (*Chætochloa italica* and var. *germanica*).

This is one of the widest-grown hay crops in the Northwest. It thrives on a variety of soils and gives abundant crops of coarse but nutritious forage. The best quality of hay is obtained by cutting just before blossoming, but after the heads are well formed. It gives better results when fed with other forage than when fed alone. It is a common practice to give one feed per day of millet hay and one or two of timothy, prairie hay, or corn fodder. Millet requires but a short time in which to reach maturity, and hence is an excellent crop for the Northwest, where the seasons are never very long at best. The fact that it can be sown late in the spring and still mature a good crop makes it a good plant to use in subduing weeds. Many different varieties are grown, but the forms of the so-called "German" millets, as golden millet and Dakota millet, are preferred by farmers generally. Hungarian grass (var. *germanica*) is often grown, but is not prized as highly as either the "common" or the "German" millet on account of the lighter yield and a tendency to remain in the soil for some years as a weed.

Montana Sand-grass (*Calamagrostis montanensis*).

A low-growing grass, inhabiting dry sandy soils. The root leaves are usually produced in abundance and "furnish considerable pasturage early in the season and then 'sun-cure' on the buttes and hill-slopes, affording a large amount of winter feed."

Muhlenbergia mexicana. (*See Mexican Wood-grass.*)

Muhlenbergia pungens. (*See Blow-out grass.*)

Muhlenbergia racemosa. (*See Wild Timothy.*)

Munroa squarrosa. (*See False Buffalo-grass.*)

Narrow-leafed American Vetch (*Vicia americana linearis*).

This is a low-growing vetch which is found in dry soil in fields and waste places. It enters quite largely into the forage of certain localities. It spreads rapidly in poorly cultivated fields, and hence is sometimes regarded as a weed.

Native Meadow Oat-grass (*Avena americana*).

"A bunch grass of the high prairies which is not widely distributed in North Dakota." When present, it furnishes valuable forage.

Native Meadow Pea (*Lathyrus palustris*).

Often quite abundant in moist meadows and edges of thickets. It is often present in considerable quantity in lowland hay and undoubtedly increases the feeding value materially.

Needle-grass (*Stipa comata*).

Abundant in dry upland prairie soil in the central and western parts of the Dakotas. It often forms a large percentage of the prairie hay. It is not cut until the "needles" have fallen, in order that they may not injure stock. In many localities on the high prairies between the James and Missouri rivers this grass often furnishes 50 per cent or more of the native hay.

Nerved Manna-grass (*Glyceria nervata*).

Abundant in shallow water and boggy meadows throughout the Northwest. It affords a large amount of excellent forage and forms an important element in lowland pastures and meadows. The seeds are a favorite food of wild fowl. This species, like Reed Meadow-grass, can be used to advantage in seeding down old sloughs or lake beds.

Old Witch-grass (*Panicum capillare*).

Common throughout the Northwest on waste and cultivated lands. Usually regarded as a weed, but often affords considerable forage in the fall, especially in stubble fields. The panicles break loose in autumn after the manner of Tickle-grass and are blown about by the wind, often in such numbers as to be quite troublesome.

Orchard-grass (*Dactylis glomerata*).

Occasional in cultivation and as an escape. It seems to be quite hardy in some localities, and should be cultivated more widely in this region. "This plant has been cultivated to some extent in North Dakota. It is reported to do well if plenty of seed is sown early in the spring. It withstands our summers better than timothy and would evidently pay well to use with red clover for meadows" (Brannon).

Oryzopsis micrantha.

This grass is quite generally distributed throughout the central and western parts of the Dakotas. It grows in dry sandy soil, and, though tough and wiry, is nutritious, and is considered a valuable grass. It is sometimes called Indian Millet, but a better common name would be Small Indian-millet, which would distinguish it from *Eriocoma*.

Oxytropis lambertii.

This plant is generally classed as one of the "loco weeds," and most observers agree in saying that stock will not eat it unless forced to do so by scarcity of forage; but according to Professor Brannon, "it is eaten readily by stock, and is present in sufficient quantities to rank with the valuable native upland forage plants."

Panicum capillare. (See Old Witch-grass.)

Panicum crus-galli. (See Barnyard-grass.)

Panicum miliaceum. (See Broom-corn Millet.)

Panicum scribnerianum. (See Small Panic-grass.)

Panicum virgatum. (See Switch-grass.)

Phalaris arundinacea. (See Reed Canary-grass.)

Phleum pratense. (See Timothy.)

Phragmites vulgaris. (See Reed-grass.)

Poa arida. (Bunch Spear-grass.)

A native species found in rather dry meadows and swales. It is an excellent grass and is frequently present in sufficient quantity to form a considerable portion of the forage in native meadows and pastures. It is quite abundant in portions of the James and Sioux valleys, and is certainly worthy of trial under cultivation. It is one of the first grasses to start in the spring and is usually in bloom in early June (fig. 7).

Poa buckleyana.

This is one of the most valuable "Bunch-grasses" in the Northwest. It is not so abundant in the Dakotas as it is in the regions nearer the Rocky Mountains, but still occurs in sufficient quantity in some of the drier localities to be an important element in the native forage.

Poa compressa.

There are several varieties of this grass found in this region. Some have been introduced, while others seem to be indigenous. The form known as "Canadian blue-grass" seems to do best under cultivation. It is harder than Kentucky blue-grass and will thrive on poorer soils, and hence is preferable for upland pastures. It seldom grows large enough to afford much hay, but as a pasture grass yields a large amount of very nutritious forage. It is an excellent grass for sheep pastures on account of its ability to endure close grazing and excessive trampling. A form of this species which is apparently indigenous grows almost as large as Kentucky Blue-grass and should be given a trial under cultivation.

Poa flava. (See Fowl Meadow-grass.)

Poa nemoralis. (See Wood Meadow-grass.)



FIG. 7.—Bunch Spear-grass (*Poa arida*).

Poa nevadensis.

Found in a "low, but dry, meadow near Grand Forks." Said to be quite abundant in this particular locality and to yield a large amount of excellent hay. It appears to be worthy of cultivation.

Poa pratensis. (See Kentucky Blue-grass.)**Porcupine-grass** (*Stipa spartea*).

Abundant in dry prairies in the eastern part of both States. From the James River west it is largely replaced by Needle-grass (*Stipa comata*). The "spears" are very injurious to sheep and often do more or less injury to other stock. The plant produces an abundance of long root leaves which are valuable for forage. When closely pastured it can not develop seed, and hence is harmless, and the "spears" fall early, so that the hay may be obtained entirely free from them.

Prairie June-grass (*Koeleria cristata*).

This, one of the earliest native grasses, is abundant everywhere on dry prairies. Certain forms of it are also common in moist meadows in some localities. It is an excellent grass for early forage, and often forms a large part of the upland hay. It was much more plentiful the past season than it had been for a number of years, furnishing as much as 50 per cent of the forage in some places. Stockmen prize it very highly. It is called "Prairie Timothy" in some localities.

Red Clover (*Trifolium pratense*).

Cultivated in the older-settled portions, and often occurring as an escape in moist, protected ditches along railroads and waste places, where it seems to thrive quite well. It is being quite successfully grown in South Dakota in the Sioux Valley and in the Big Stone Basin. At Sioux Falls it has been grown with timothy for many years with very satisfactory results. "Various reports are given regarding its possible cultivation in North Dakota. The average opinion seems to be that it can not be successfully grown here. Personal observation teaches that it does well when sown in moist upland meadows which are somewhat protected, and that it does much better when mixed with timothy than when sown alone. It deserves to be cultivated more extensively" (Brannon).

Red-top (*Agrostis alba vulgaris*).

Cultivated more or less extensively in the moister portions of both States. Professor Brannon says "it yields a heavy crop in low, rather moist meadows, and does quite well on higher, dry ground." It does well in South Dakota in moist situations, and should be given a prominent place for mixtures to be sown on boggy lands or lake beds.

Reed Canary-grass (*Phalaris arundinacea*).

Common in low, moist meadows throughout the Northwest. In some localities it is being cultivated with good success. "It yields a large supply of excellent hay, which is greatly relished by all stock. The leaves remain green after fruiting, and the grass may be cut quite late and yet make very good hay. All observations and collections of this grass show that it is one of the most profitable lowland grasses in the State, and may be cultivated with confidence in moist or boggy soils" (Brannon).

Reed Fescue (*Scolochloa arundinacea*).

Rather a rare grass, growing in the shallow waters of sloughs and lake beds, occasionally occurring in sufficient quantity to form an important element in the lowland hay. It yields heavily, but is not very rich in the more important nutrient substances. It fruits abundantly, and might be used to advantage on very wet meadow lands.

Reed-grass (*Phragmites vulgaris*).

More or less abundant throughout in sloughs and margins of lakes and streams. It grows too large to be very valuable as a forage plant. While it is young it is often eaten by stock, and it is sometimes used for fodder, but its principal use is for thatching granaries and stock sheds. The "plumes" are much used for dry bouquets in winter decorations. On the sand bars along the Missouri River the rootstocks grow to an enormous length.

Reed Meadow-grass (*Glyceria aquatica*).

Common in shallow water, often furnishing a considerable part of the hay obtained from wet boggy meadows. The forage is relished by stock, but is not high in feeding value. The seeds are produced in abundance and form an important part of the food of wild fowl. It is a good grass for use in reclaiming old sloughs, bogs, and lake beds.

River Club-rush (*Scirpus fluriatilis*).

This rush is quite abundant in many places along fresh-water streams, lakes, and ponds and in sloughs. It is one of the most important of the rushes growing in this region, furnishing a large amount of forage which is relished by stock early in the season. It is an important element in "slough grass hay," and, though coarse, is readily eaten by stock and contains a high percentage of crude protein. It yields an abundance of seed, which makes an excellent food for poultry and has even been fed to cattle and horses with good results. It should be crushed or ground up when fed to stock, on account of the very hard seed coats. The large shallow lakes common in parts of the Dakotas are often almost entirely covered with this plant. Very frequently the lakes dry up in the latter part of the summer and many hundreds of tons of hay are cut from them.

Rush (*Scirpus* spp. and *Juncus* spp.).

For the more important kinds see Bog-rush, River Club-rush, and Meadow-rush.

Russian Thistle (*Salsola tragus*).

This vile weed has become quite generally distributed throughout the Northwest. When other forage is scarce stock will eat this plant quite readily either in the fresh state or when cured for hay, especially if, in the latter case, it is mixed with oat or millet hay. It has been fed to sheep with best results and many farmers in this region have wintered their flocks with little else in the shape of "roughness." But while many follow this practice if the "thistle" is already present on the farm, no one would recommend it to be sown for forage on account of its pernicious habits as a weed.

Rhynchospora capillacea. (See Slender Beak-rush.)**Salt-bushes (*Atriplex* spp.).**

These plants occur in greater or less abundance in saline soils throughout the Northwest. One or two species have been introduced and several are indigenous. In many places in central and western Dakota these plants constitute a large part of the vegetation and furnish much of the native forage. All kinds of stock eat them with greater or less readiness and sheep are particularly fond of them. It is quite probable that some of the Australian salt-bushes could be introduced with profit into the regions where our native species flourish.

Salt-grass (*Distichlis spicata striata*).

Abundant in saline soils throughout the Northwest. It is seldom eaten by stock unless there is a scarcity of better grasses. In the Bad Lands and elsewhere on the ranges, however, it is of considerable importance, as it thrives on soils that will produce but few other grasses. Sheep eat it more readily than other stock. It thrives along the irrigating ditches where they run through the "alkali" spots.

Sand-bur (*Cenchrus tribuloides*).

This grass occurs in great abundance in sandy soil in the Missouri Valley and, though stock eat it while young, it is regarded as a vile weed on account of the "burs" which are formed by the matured spikelets.

Sand Vetch (*Vicia villosa*).

This vetch is one of the hardiest legumes that has been cultivated for forage in the Northwest. It endures drought perfectly, grows rapidly, yields well, and is in condition to use at a time when the native forage is likely to be short on account of the dry weather of July and August. Its feeding value is very high and the forage in the fresh or dry state is greedily eaten by stock. At Brookings, Mellette, and elsewhere in South Dakota, as well as in North Dakota, it has given the best results. For summer soiling, for which it is most valuable, it may be sown in April or May, using a bushel to a bushel and a half of seed per acre with a like quantity of oats or other small grain. It should be fed in connection with plenty of prairie grass, grain straw, and like forage in order that all of the protein may be utilized. Green Corn, Cane, or Kaffir Corn can be fed with it to good advantage. The only obstacle in the way of the general cultivation of this vetch is the scarcity of seed and the difficulty in saving it in any large quantity, due to the habit of the plant of ripening seed in such small amounts at a time and continuing to bud and blossom until it freezes up in the fall.

Savastana odorata. (*See Sweet-grass.*)

Schedonnardus paniculatus. (*See Wild Crab-grass.*)

Scirpus atrovirens pallidus. (*See Meadow-rush.*)

Scirpus fluviatilis. (*See River Club-rush.*)

Scirpus lacustris. (*See Great Bulrush.*)

Scirpus robustus. (*See Sea Club-rush.*)

Scolochloa arundinacea. (*See Reed Fescue.*)

Sea Club-rush (*Scirpus robustus*).

More or less abundant in brackish water in both the Dakotas. What has been said regarding the uses of River Club-rush will apply equally well to this species.

Sedges (*Carex* spp.).

There is a great variety of sedges growing in this region. Though most of them are too rare to be of much economic importance, there are a few which add materially to the native forage in certain localities. Giant Sedge (*Carex aristata*) and Upright Sedge (*C. stricta*) afford a large amount of hay and pasturage on wet, boggy lands. Straw-colored Sedge (*Carex straminea*) and its relatives, with Silvery-topped Sedge (*Carex siccata*) and Brown-topped Sedge (*C. sartwellii*), add more or less to the forage of the drier meadows. On the dry uplands Dwarf Sedge (*Carex stenophylla*) and other small species, like *Carex pennsylvanica* and *C. communis*, form an important element in the pasturage, particularly early in the season before the true grasses have developed sufficiently for grazing.

Sheep's Fescue (*Festuca ovina*).

This is one of the most valuable of the Fescues for this region. Certain forms of this species are indigenous to the Black Hills region of South Dakota. Sheep's Fescue thrives on sandy soils and is an excellent plant for use in upland pastures, particularly those in which sheep are allowed to run. It is very hardy and grows well from seed. Red Fescue (*Festuca rubra*) has also been cultivated more or less in the Dakotas, and in some respects is even more desirable than Sheep's Fescue. It forms a better sod and is a stronger grower.

Short-leaved Eatonia (*Eatonia nitida*).

Found occasionally in the eastern part of North Dakota. The forage is of good quality, but the grass is too rare to be of much importance.

Sisyrinchium angustifolium. (See Blue-eyed grass.)**Slender Beak-rush** (*Rhynchospora capillacea*).

Rare and too small to be of any importance as a forage plant.

Slender Cord-grass (*Spartina gracilis*).

Much like the common Cord-grass, but smaller and of less importance agriculturally.

It occurs in moist saline soils, and, to a certain extent, replaces the larger species in the western part of the Dakotas.

Slender Fescue (*Festuca octoflora*).

A slender annual found on dry, rocky knolls. It adds more or less to the forage during the early part of the season, but it ripens its seeds and dries up so early that it is of little importance agriculturally. Its chief value lies in the fact that it thrives on soils upon which few other grasses will grow.

Slender Wheat-grass (*Agropyron tenerum*).

This is one of the best of the wheat-grasses. It is not so aggressive as some of the other species, as it does not spread by means of underground stems. It responds quickly to cultivation and gives heavy yields of first-class hay. It should receive more attention from farmers and stockraisers. (See fig. 1.)

Slough-grass (*Beckmannia erucaeformis*).

Abundant in sloughs and wet places. While young it is much relished by stock, and often forms a considerable amount of the forage in low pastures and meadow lands. The hay, though readily eaten by stock, is not rich in crude protein, and hence is not so valuable as that of many other grasses in this region. In the artesian basin this grass is spreading rapidly along the streams formed by the waste water from the wells, and it seems possible that it may become an important grass in localities where better species can not be grown (fig. 8).



FIG. 8.—Slough-grass
(*Beckmannia erucaeformis*).

Small Panic-grass (*Panicum scribnerianum*).

Not uncommon in rather dry upland meadows, furnishing a small amount of nutritious forage.

Smooth Brome-grass (*Bromus inermis*).

An introduced species, which is rapidly becoming one of the most important forage plants of this region. Its hardiness, heavy yield of both forage and seed, and the ease with which a good stand can be obtained make it a very desirable grass for permanent meadows and pastures. It is not a good grass to use in short rotations, as the very characters which render it so hardy and so desirable for permanent fields enable it to persist in the soil, and hence it may become a weed under such conditions.

Sorghum (*Andropogon sorghum* vars.).

The saccharine sorghums are often cultivated for the manufacture of molasses and also for forage. For the latter purpose they are usually sown broadcast or in

drills and cut and fed green as a soiling plant or cured for hay. They are very greedily eaten by stock of all kinds, and nearly all who have tried growing them for forage are well pleased with the results obtained. The Early Amber varieties seem to be the favorites in this region, particularly the one known as Minnesota Early Amber.

Southern Poverty-grass (*Sporobolus vaginæflorus*).

This species is very common in eastern and southern South Dakota in dry soil along railroad grades, in waste places, and neglected fields. Though often eaten by stock, it affords but little forage and has practically no agricultural value.

Southern Spear-grass (*Eragrostis purshii*).

More or less common in dry soil, in waste places, and along railroad grades. Of little value agriculturally.

Spartina cynosuroides. (See Cord-grass.)

Spartina gracilis. (See Slender Cord-grass.)

Spiked Muhlenberg's-grass. (See *Muhlenbergia racemosa*.)

Spike-rush (*Eleocharis* spp.).

These little rushes often furnish a considerable amount of forage in wet, boggy meadows and pastures. They are relished by stock and compare favorably in feeding value with the grasses growing in similar places.

Sporobolus airoides.

Common in saline soils in the Bad Land regions, where it affords more or less forage and is quite highly prized by stockmen.

Sporobolus asperifolius. (See Fine-topped Salt-grass.)

Sporobolus brevifolius.

A grass of little agricultural value, growing in rather dry soils. It is often called "prairie-grass" and "wire-grass."

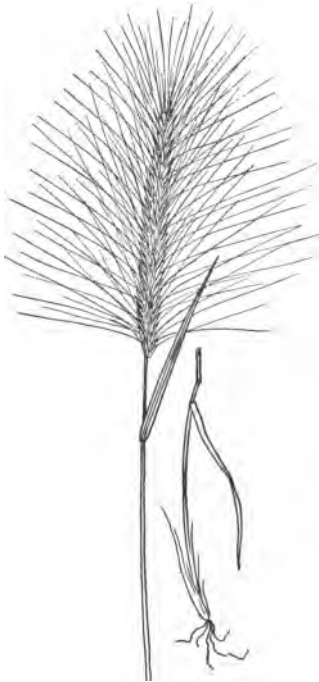


FIG. 9.—Squirrel-tail-grass (*Hordeum jubatum*).

Sporobolus cryptandrus.

More or less widely distributed throughout the Northwest in dry sandy soils. It is of little importance except perhaps in the Bad Lands, where it is often very abundant and is said to be "readily eaten by range cattle."

Sporobolus heterolepis. (See Wire-grass.)

Sporobolus longifolius. (See Long-leaved Prairie-grass.)

Sporobolus vaginæflorus. (See Southern Poverty-grass.)

Squirrel-tail (*Hordeum jubatum*).

This grass has become very abundant throughout nearly all parts of the Northwest.

It furnishes a considerable amount of good pasturage early in the season, but later becomes a very bad pest. The rough "beards" work into the mouths of stock, especially horses, and cause ulcerated sores. Not unfrequently the animal becomes almost unable to eat, and unless promptly relieved may be permanently injured. The "beards" are also a source of annoyance to anyone walking through a field containing the pest, as they work into the clothing and can only be dislodged with difficulty (fig. 9).

Stink-grass (*Eragrostis major*).

A common grass of weedy habit. It yields considerable forage but stock avoid it, except when it is young or when cured as hay, on account of the strong odor given off by the inflorescence.

Stipa comata. (See Needle-grass.)**Stipa spartea**. (See Porcupine-grass.)**Stipa viridula**. (See Feather Bunch-grass.)**Swamp-chess** (*Bromus ciliatus*).

Widely distributed in dry woodland pastures, but seldom occurring in sufficient quantity in any one locality to afford much forage:

Sweet-grass (*Savastana odorata*).

This sweet-scented grass is quite generally distributed throughout the eastern part of both States. It possesses very little value as a forage crop, but the panicles are very much prized for filling sofa pillows and for winter bouquets. It sometimes becomes quite a pest in wheat fields, as it is difficult to eradicate on account of its strong rootstocks.

Switch-grass (*Panicum virgatum*).

Grows abundantly on moist meadows and to some extent on dry ground throughout the Northwest. It is a hardy grass and a strong grower, furnishing a large amount of pasturage, or, if allowed to stand until it blooms, yields a large crop of nutritious hay. It should be cut rather early to avoid the woody stems and loss of seed. When mature, the seed can be readily secured and the grass might be cultivated to advantage. In some localities it is known as "False Red-top." It thrives in the vicinity of the artesian waters and would doubtless improve rapidly under irrigation.

Tall Fescue (*Festuca elatior*).

Occasional in cultivation. It does well in low, rich meadows, but does not thrive on the upland soils and is less valuable for this region than Meadow Fescue.

Tall Grama (*Bouteloua racemosa*).

This grama is found throughout both States on the upland prairies. It is not so well liked by stock as "Blue Grama" and many other of the prairie grasses, hence it is not so valuable a pasture grass. It produces a fine growth of long root leaves which, when cut for hay, are readily eaten by stock, and it thrives better on light dry soils than most other species; consequently it is one of the most important hay grasses of the region.

Tall Oat-grass (*Arrhenatherum elatius*).

This is an excellent grass for meadows, and, though it does best on lowlands, gives fairly good returns on upland farms. It deserves a more general cultivation in the Dakotas and elsewhere in the Northwest. The forage is of excellent quality. The grass has given splendid results at Brookings and Mellette, S. Dak., and can be grown to the best advantage in mixtures with Red-Top, the Fescues, and like grasses.

Tickle-grass (*Agrostis scabra*).

Common everywhere, but of little value agriculturally.

Timothy (*Phleum pratense*).

Cultivated, and occurring as an escape. It is extensively grown throughout a large portion of South Dakota, which is becoming one of the most important "timothy-seed" growing States in the Union. "It is successfully grown in the moister portion of North Dakota. The first crop is reported to be the best and each succeeding one is lighter. The slight rainfall in many parts of the State hinders its cultivation in those regions. It yields a very good crop when mixed with a clover of some sort. It is improving with each succeeding season, which is due to the change in soil and climate, and indicates that it will become an important hay-producing plant in this State in the near future" (Brannon).

Trifolium beckwithii. (*See Beckwith's Clover.*)

Trifolium hybridum. (*See Alsike.*)

Trifolium pratense. (*See Red Clover.*)

Trifolium repens. (*See White Clover.*)

Tufted Hair-grass (*Deschampsia cespitosa*).

"Grows in bunches in moist meadows and affords considerable hay, but unless it is cut early it is quite woody and lacking in nutrition" (Brannon).

Turkey-foot. (*See Andropogon hallii and A. provincialis.*)

Vicia americana. (*See American Vetch.*)

Vicia americana linearis. (*See Narrow-leaved American Vetch.*)

Vicia villosa. (*See Sand Vetch.*)

Vigna catjang. (*See Cow Pea.*)

Western Beard-grass (*Aristida fascicularis*).

More or less abundant in dry, sandy soils on prairies, waste places, and on gravelly knolls. While young it is eaten by stock, but the stems soon become so tough and wiry as to be unpalatable even in hay, and the grass is very difficult to cut with a mower. It has little value agriculturally.

Western Quack-grass (*Agropyron pseudorepens*).

Similar in distribution to Western Wheat-grass and, like that species, a valuable forage grass. (*See also Agropyron.*)

Western Wheat-grass (*Agropyron spicatum*). (*See Agropyron.*)

White Clover (*Trifolium repens*).

This is the most commonly grown clover in the Northwest. Though of no value for hay, it is an excellent pasture plant and thrives on a variety of soils. Its ability to withstand close grazing and excessive trampling makes it a good plant for sheep pastures. It is extensively grown on lawns and in dooryards.

White Sweet Clover (*Melilotus alba*).

Not infrequent in cultivation and occasionally as an escape. It is rather unpalatable as a forage, and stock will seldom eat it unless mixed with other fodder. It is an excellent honey plant, however, and is often grown for this purpose. It is perfectly hardy in the Northwest, and gives heavy yields under irrigation. "This plant was seen growing on irrigated ground on the southern slope of Turtle Mountains. It was 5 or 6 feet high and grew in a very dense mass. The owner had endeavored to clear the place of the plant, but had not been successful. It makes such an immense growth that it might be of considerable value for silage" (Brannon).

Wild Barley (*Hordeum nodosum*).

This grass seems to be rather rare in this region. It grows in moist, saline soils, but seldom occurs in sufficient quantity to be of much importance as a forage plant. Stock eat it readily, particularly before it "heads out."

Wild Crab-grass (*Schedonnardus paniculatus*).

An inconspicuous grass occurring in dry, sandy soils on prairies and in waste places. It is most abundant in central and western South Dakota, and is of practically no importance agriculturally.

Wild-oats (*Avena fatua*).

This grass has been introduced into grain fields and along railroads. Though it affords fairly good forage if cut while young, it is not so valuable for this purpose as common oats, and when once started in a field it is very difficult to get rid of. It is therefore to be regarded as a weed, and should be destroyed at once.

Wild-rye (*Elymus canadensis*).

Occurs in almost every section of the Northwest, and in some places yields a large crop of excellent hay. It is also valuable for early pasturage. It is frequently affected with ergot and should be cut before the fungus has developed.

Wild Timothy (*Muhlenbergia racemosa*).

More or less frequent in the eastern part of both States, generally on rather moist land. It yields well, but the forage is of only average quality. In some localities it is highly valued.

Wild Vetch (*Hosackia purshiana*).

This is probably the most valuable of the native vetches. It occurs throughout the Northwest in rather sandy soils. All kinds of stock eat it greedily, both in the green state and as hay, and stockmen regard it as one of the best forage plants



FIG. 10.—Wild Vetch (*Hosackia purshiana*).



FIG. 11.—Winter Fat (*Eurotia lanata*).

in the region. It has been much more abundant the past season than usual. It is more than likely that this plant will prove valuable for cultivation in sandy soils. In many localities along the Missouri River this vetch forms a considerable part of the native hay (fig. 10).

Wild Water Foxtail (*Alopecurus geniculatus* and var. *fulvus*).

More or less abundant in wet, boggy places. It affords a small amount of very good forage.

Winter Fat (*Eurotia lanata*).

A woolly, half-shrubby perennial found more or less abundantly in central and western Dakota. It thrives on "alkali" lands, and is much prized as a winter forage. It is claimed that animals eating this plant are less likely to be unhealthy, as it acts as a preventive of disease (fig. 11).

Wire-grass (*Sporobolus heterolepis*).

More or less abundant in dry meadows, on hillsides, and along swales. It is not relished by stock while in bloom on account of a strong, disagreeable odor which it gives off. At other times, however, and particularly when it is cured, stock eat it readily. The yield of forage is large because of the abundance of root-leaves produced. In the Sioux Valley it forms an important element in the native forage.

Wood Meadow-grass (*Poa nemoralis*).

Abundant in dry woodlands and broken prairies, often affording a great deal of forage.

Yellow Foxtail (*Chenopodium glauca*).

An introduced grass of weedy habit more or less common throughout the Northwest.

Though a vile weed under most circumstances, like Green Foxtail, it may be used for forage to good advantage when it occurs in sufficient abundance and better forage is scarce. It is often called "Pigeon-grass" by farmers.

Yellow Sweet Clover (*Melilotus officinalis*).

This legume is perfectly hardy and gives an immense yield of forage. As with White Sweet Clover, stock will not eat it very well alone, because of a bitter substance which is present in considerable quantity. "This plant grows luxuriantly in the Turtle Mountains. It is not very valuable for forage, but may be cut with other forage plants while tender and the mixed hay will be readily eaten by stock. The abundant growth of the sweet clovers is in correspondence with other observations on the favorable adaptation of the soil and climate to the luxuriant growth of many valuable *leguminosa*" (Brannon).

Zizania aquatica. (See Indian Rice.)

A CLASSIFIED LIST OF THE GRASSES AND FORAGE PLANTS COLLECTED OR OBSERVED IN THE DAKOTAS IN 1896.

GRAMINEÆ.

ANDROPOGONEÆ.

Andropogon hallii Hack.

North Dakota: Rugby Junction (Brannon 101).

South Dakota: Iron Springs in the Bad Lands (Williams).

Dry soil of sand hills.

Andropogon nutans L.

North Dakota: Grand Forks (Brannon 41), Oakes.

South Dakota: Aberdeen (Griffiths 103), Frankfort (Griffiths 52), Brookings, Plankinton (Wilcox 23), Chamberlain (Wallace 50).

Dry bottoms, rare except in the Sioux Valley.

Andropogon provincialis Lam.

North Dakota: Dickinson (Brannon 135), Minot, Bottineau, Devil's Lake, Jamestown, Grand Forks.

South Dakota: Brookings, Frankfort (Griffiths 59a, 59b), Aberdeen (Griffiths 135), Huron (Griffiths 20), Pierre (Griffiths 38), Blunt, Plankinton, Sioux Falls, White River (Wallace 15), Aurora County (Wilcox 51).

Moist prairies, chiefly east of the Missouri. Mr. Griffiths' number 59b has the leaves and sheaths more or less hairy, and has been called *var. villosus* by various writers.

***Andropogon scoparius* Michx.**

North Dakota: Grand Forks (Brannon 26), Devil's Lake, Oakes, Jamestown, Bad Lands.

South Dakota: Aberdeen (Griffiths 138), Huron (Griffiths 19), Frankfort (Griffiths 51), Brookings, Plankinton, Pierre, Bad Lands, White River (Wallace 13, 14), Aurora County (Wilcox 50).

Dry prairies.

PANICEÆ.***Beckmannia erucæformis* Host.**

North Dakota: Grand Forks (Brannon 28), Larimore, Church's Ferry, Minot Bismarck.

South Dakota: Brookings (Wilcox 57), Plankinton (Wilcox 8), Iroquois, Artesian, City (Wilcox 59).

In wet ground along coulees and sloughs. It is becoming abundant along irrigating ditches and about reservoirs.

***Panicum capillare* L.**

North Dakota: Medora (Brannon 134), Grand Forks, Oakes, Fargo.

South Dakota: Huron (Griffiths 7, 15), Aberdeen (Griffiths 120), Brookings, Cheyenne River (Wallace 2), White River (Wallace 46) a very depauperate form.

In dry soil of fields, in sandy basins, and on rolling prairies.

***Panicum crus-galli* L.**

North Dakota: Church's Ferry (Brannon 56), Minot, Dickinson, Medora, Devil's Lake, Oakes, Jamestown, Grand Forks, Fargo.

South Dakota: Brookings, Frankfort (Griffiths 58a², 58b), Watertown, Redfield, Sioux Falls, Doland, Iroquois, Aurora County.

Moist ground in fields, etc., becoming very abundant along irrigating ditches and about reservoirs.

***Panicum crus-galli muticum* Vasey.**

South Dakota: Aberdeen (Griffiths 108), Huron (Griffiths 14), Frankfort (Griffiths 58a, 58b²), Brookings, Sioux Falls, Iroquois.

Fields and waste places. Like the species, it is becoming plentiful along irrigating waters.

***Panicum depauperatum* Muhl.**

South Dakota: Brookings (Wilcox 14), Aurora County, along Firesteel Creek.

Dry fields and prairies. The Brookings specimens are thickly covered with long hairs; the panicles are all borne on shortened stalks and the stem is much branched above.

***Panicum miliaceum* L.**

South Dakota: Brookings, Aberdeen, Groton, Sioux Falls.

Cultivated, and often occurring as an escape.

***Panicum proliferum* Lam.**

Jefferson, Greene County, Iowa (Wilcox 27).

Moist soil along roadsides, etc.

***Panicum pubescens* Lam.**

South Dakota: Rosebud (Wallace 1).

Dry soil of uplands, rare.

***Panicum scribnerianum* Nash. (*Panicum scoparium* of the manuals).**

North Dakota: Merrifield (Brannon 10), Oakes.

South Dakota: Rosebud (Wallace 28), Brookings, Aurora County.

Rather dry, open ground. It is common in the Sioux Valley, but it is apparently rare elsewhere.

***Panicum scribnerianum leibergii* Scribn.**

South Dakota: Brookings (Wilcox 16).

Low, moist prairies and bottom lands, not yet found outside of the Sioux Valley.

Distinguished from the species by its larger size, more conspicuously tuberculate-hairy leaves and sheaths, and contracted panicle. It has much of the aspect of *P. xanthophysum* Gray, but that species has smooth leaves and the lower empty glume is longer.

***Panicum virgatum* L.**

North Dakota: Dunseith (Brannon 99), Minot, Church's Ferry, Minnewaukon, Dickinson, Grand Forks, Fargo, Oakes.

South Dakota: Frankfort (Griffiths 53), Huron (Griffiths 22), Aberdeen (Griffiths 82, 132), Brookings (Wilcox 15), Aurora County (Wilcox 54), along Firesteel Creek, Watertown, Sioux Falls, White River (Wallace 3, 4, 5). Generally on moist prairies and bottom lands, but occasionally found in drier soils. The last one of Mr. Wallace's specimens is a very much dwarfed form.

***Panicum wilcoxianum* Vasey.**

South Dakota: Brookings.

Dry soil, rare. It probably occurs elsewhere in the State, being confused with *P. scribnerianum* and *P. depauperatum*, between which it is intermediate.

***Chaetochloa glauca* (L.) Scribn. in Bull. 4, Div. Agros., p. 39 (1897).**

South Dakota: Frankfort (Griffiths 54), Brookings, Sioux Falls, Iroquois, Aurora County.

***Chaetochloa italica* (L.) Scribn. l. c.**

Cultivated more or less extensively throughout the agricultural regions of both States, and often occurring as an escape in old fields and waste places.

***Chaetochloa italica germanica* (Mill.) Scribn. (*Panicum germanicum* Mill.)**

North Dakota: Webster's Chapel (Brannon 55), Church's Ferry, Langdon, Grand Forks, Fargo.

South Dakota: Brookings, Aberdeen, Watertown, Sioux Falls. Cultivated, and occasionally escaped.

***Chaetochloa viridis* (L.) Scribn. l. c.**

North Dakota: Devil's Lake (Brannon 50), Minot, Bottineau, Fargo, Grand Forks, Dickinson, Oakes.

South Dakota: Aberdeen (Griffiths 123), Brookings, Sioux Falls, Iroquois, Aurora County.

In dry soil of cultivated fields.

***Cenchrus tribuloides* L.**

South Dakota: Pierre (Griffiths 30, 34), Chamberlain, Vermilion, Elk Point. Sandy soil in fields and waste places.

ORYZÆ.

***Zizania aquatica* L.**

South Dakota: Huron (Griffiths 8), Tacoma Park (Griffiths 118), Brookings (Wilcox 33, 34), Sioux Falls.

Edges of streams and lakes.

***Homalocenchrus oryzoides* (L.) Poll.**

South Dakota: Frankfort (Griffiths 49), Huron (Griffiths 10), Redfield (Griffiths 79), Brookings, Davison County (Wilcox 28), Bear Creek (Wallace 64).

Wet places along margins of streams.

Homalocenchrus virginicus (Willd.) Britton.

South Dakota: Brookings (Wilcox 70), Sioux Falls, Aurora County.
Low, wet places in woods and on banks of streams.

PHALARIDÆ.

Phalaris arundinacea L.

North Dakota: Church's Ferry (Brannon 59), Grand Forks, Merrifield, Devil's Lake, Oakes.

South Dakota: Brookings (Wilcox 71), Aberdeen (Griffiths 127), Mellette (Griffiths 147), Aurora County (Wilcox 38), Antelope Creek (Wallace 42).

On low, wet ground or in shallow water; occasionally found in cultivation.

Savastana odorata (L.) Scribn.

North Dakota: Willow City (Brannon 80), Grand Forks (Brannon 4), Devil's Lake, Langdon, Minot, Church's Ferry.

South Dakota: Brookings (Wilcox 17), Iroquois, Oakwood Lakes.

Moist meadows and fields.

AGROSTIDÆ.

Aristida basiramea Engl.

On the Waupsipinicon River, Iowa (Wilcox 30).
Dry soil.

Aristida fascicularis Torr.

South Dakota: Canning (Griffiths 43), Redfield (Griffiths 68), Aurora County (Wilcox 35), Rosebud (Wallace 34), White River (Wallace 33).

Aristida gracilis Elliott.

Waupsipinicon River, Iowa (Wilcox 31).
Dry banks, etc.

Stipa comata Trin. and Rupr.

North Dakota: Devil's Lake (Brannon 54), Merrifield (Brannon 23), Dickinson (Brannon 122), Grand Forks, Bottineau, Willow City, Church's Ferry, Oakes, Jamestown, Mandan.

South Dakota: Brookings (Wilcox 47), Aberdeen (Griffiths 86), Aurora County, Huron, Blunt, Indian Creek.

Dry, sterile soils, most abundant in the regions west of the James River.

Stipa spartea Trin.

North Dakota: Church's Ferry (Brannon 72), Grand Forks (Brannon 12), Devil's Lake, Bottineau, Minot, Dickinson, Fargo.

South Dakota: Brookings, Sioux Falls, Millbank, Aurora County.

Dry upland prairies, most abundant east of the James River.

Stipa viridula Trin.

North Dakota: Minot (Brannon 113), Dickinson, Oakes, Jamestown, Bismarck, Mandan.

South Dakota: Aberdeen (Griffiths 130), Huron, Blunt (Griffiths 107), Brookings (Wilcox 11), Aurora County (Wilcox 40), Rosebud (Wallace 35).

In dry soil of high prairies.

Sporobolus airoides Torr.

South Dakota: White River (Wallace 38), Indian Creek.

Dry, sterile soil of the Bad Lands region.

Sporobolus longifolius (Torr.) Wood.

North Dakota: Oakes.

South Dakota: Frankfort (Griffiths 48), Redfield (Griffiths 71), Brookings, Aurora County (Wilcox 21), Indian Creek (Wallace 32), Ree Heights (Griffiths 45).
Dry, rather sandy soil, in prairies and along railroad grades.

Sporobolus asperifolius Thurb.

South Dakota: Aurora County, Indian Creek, Iroquois (Wilcox 67).
Dry, sterile soil, abundant in the Bad Lands and on the ranges west of the Missouri.

Sporobolus brevifolius (Nutt.) Scribn. (*S. cuspidatus* of the manuals.)

North Dakota: Grand Forks (Brannon 48), Medora (Brannon 139), Minnewaukon (Brannon 65), Dickinson, Oakes.

South Dakota: Brookings (Wilcox 12), Redfield (Griffiths 70), Frankfort (Griffiths 60), Huron (Griffiths 12), White River (Wallace 37), Indian Creek (Wallace 36), Aurora County (Wilcox 52, 53).

Dry soil, throughout both the Dakotas.

Sporobolus cryptandrus (Torr.) Gray.

North Dakota: Medora (Brannon 125), Oakes.

South Dakota: Pierre (Griffiths 25, 32), Scatterwood (Griffiths 91, 104), Aurora County (Wilcox 6).

Dry, sandy soil.

Sporobolus heterolepis Gray.

North Dakota: Willow City (Brannon 77), Minot (Brannon 112), Dickinson (Brannon 132).

South Dakota: Brookings (Wilcox 10), Sioux Falls, Flandreau.

In dry soil along the borders of swales and on hillsides.

Sporobolus vaginæflorus (Torr.) Vasey.

South Dakota: Brookings, Sioux Falls, Aberdeen (Griffiths 94), Redfield (Griffiths 65), Pierre (Griffiths 36), Wessington (Griffiths 42), Huron, Iroquois, Aurora County (Wilcox 20).

Muhlenbergia racemosa (Michx.) B. S. P.

North Dakota: Girard Lake (Brannon 88), Oakes.

South Dakota: Brookings, Sioux Falls, Aberdeen (Griffiths 133), Redfield (Griffiths 77), Huron (Griffiths 21), Pierre (Griffiths 28, 35), Aurora County (Wilcox 26), White River (Wallace 30).

Dry bottom lands.

Muhlenbergia mexicana Trin.

South Dakota: Huron (Griffiths 6), Brookings, Sioux Falls, Aurora County (Wilcox 25).

Moist bottom lands. Griffiths' No. 6 is a form approaching the preceding species.

Muhlenbergia pungens Thurb.

South Dakota: Rosebud (Wallace 61).

Sandy soil of "blow outs," etc.

Eriocoma cuspidata Nutt.

North Dakota: Rugby Junction (Brannon 96), Dickinson.

South Dakota: Bad Lands along the Cheyenne River (Wallace 39).

In sterile, sandy soil, growing in dense bunches.

Oryzopsis micrantha Thurb.

South Dakota: Top of Sheep Mountain, near Cheyenne River (Wallace 40).

Sterile, sandy soil.

Phleum pratense L.

North Dakota: Grand Forks (Brannon 18), Iola, Church's Ferry, Hillsboro, Fargo, Oakes.

South Dakota: Millbank, Watertown, Brookings, Sioux Falls, Mellette (Griffiths 144), Plankinton.

Cultivated lands.

***Alopecurus geniculatus* L.**

South Dakota: Head of White Willow Creek (Wallace 56).

Wet-soil.

***Alopecurus geniculatus fulvus* (Smith) Scribn.**

North Dakota: Grand Forks (Brannon 30), Devil's Lake, Fargo.

South Dakota: Brookings, Sioux Falls, Salem, Aurora County (Wilcox 55, 69), Rosebud (Wallace 28).

Wet, boggy meadows, and in shallow water.

***Agrostis alba* L.**

North Dakota: Red River Valley.

South Dakota: Brookings, Frankfort (Griffiths 56), Redfield (Griffiths 78), Sioux Falls.

***Agrostis scabra* Willd.**

North Dakota: Bottineau (Brannon 82), Langdon, Grand Forks, Dunseith (Brannon 98), Rugby Junction, Minot (Brannon 111), Medora, Fargo, Dickinson, Willow City (Brannon 81).

South Dakota: Brookings (Wilcox 64), Sioux Falls, Salem, Huron, Aurora County, head of White Willow Creek (Wallace 41).

In dry or moist soil everywhere.

***Calamagrostis americana* (Scribn.) Scribn. Bull. 5, Div. Agros., p. 27 (1897). (*C. robusta* Vasey, not Phillipi.)**

North Dakota: Willow City (Brannon 76), Church's Ferry, Grand Forks, Oakes, Fargo.

South Dakota: Brookings (Wilcox 48, 49, 61, 62), Plankinton (Wilcox), Huron, Aberdeen (Griffiths 95), Rosebud (Wallace 31).

In moist soil of lowlands.

Mr. Wilcox's No. 61 is a form with the inflorescence much more contracted than usual.

***Calamagrostis canadensis* Beauv.**

North Dakota: Church's Ferry (Brannon 61, 63), Minot, Devil's Lake, Oakes, Fargo.

South Dakota: Brookings, Sioux Falls, Arlington, Aberdeen, Huron, Plankinton.

In moist soil, becoming quite abundant along irrigating ditches and about reservoirs.

***Calamagrostis scribneri* Beal. (*Calamagrostis dubia* Scribn.).**

North Dakota: Bottineau (Brannon 91), Edinburg.

Moist soil of low prairies.

***Calamagrostis montanensis* Scribn.**

North Dakota: Medora (Brannon 130).

South Dakota: Brookings, Rondell (Griffiths 129), Aurora County (Wilcox 44).

Dry hills and prairies.

***Calamovilfa longifolia* (Hook.) Scribn.**

North Dakota: Dickinson (Brannon 118), Medora, Mandan, Bottineau, Church's Ferry, Minnewaukon, Minot, Oakes, Fargo.

South Dakota: Brookings (Wilcox 13), Sioux Falls, Salem, Iroquois, Huron, Watertown, Aberdeen (Griffiths 113, 136), Pierre (Griffiths 29), Aurora County (Wilcox 56), White River (Wallace 49).

Sandy soil.

AVENEÆ.

Deschampsia cæspitosa Beauv.

North Dakota: Inkster (Brannon 34).

In moist soil of low meadows.

Avena fatua L.

North Dakota: Grand Forks (Brannon 49), Dickinson (Brannon 115).

South Dakota: Castlewood (Griffiths 141), Elkton, Deuel County.

In dry cultivated fields and along railroad grades.

Avena americana Scribn.

North Dakota: Langdon (Brannon 38).

In dry soil on high prairies. Culms in bunches.

Avena sativa L.

North Dakota: Inkster (Brannon 40).

Adventitious along roadsides. Extensively cultivated throughout both the Dakotas.

Arrhenatherum elatius (L.) Beauv.

South Dakota: Brookings, Mellette (Griffiths 142).

Cultivated, and occasionally as an escape.

CHLORIDEÆ.

Schedonnardus paniculatus (Nutt.) Trelease.

South Dakota: Aberdeen (Griffiths 121), Pierre (Griffiths 31), Aurora County (Wilcox), Cheyenne River at the mouth of Battle Creek (Wallace 43).

Dry sterile soil.

Spartina cynosuroides Willd.

North Dakota: Dickinson (Brannon 119), Red River Valley, Oakes, Mandan.

South Dakota: Brookings, Sioux Falls, Aberdeen (Griffiths 96, 116), Huron (Griffiths 3), Firesteel Creek (Wilcox).

More or less abundant in sloughs and along irrigating ditches.

Spartina gracilis Trin.

North Dakota: Minnewaukon (Brannon 64), Bad Lands west of the Missouri.

South Dakota: Aberdeen (Griffiths 125), Clark County (Carter), Cheyenne River at the mouth of Indian Creek (Williams and Wilcox, August, 1891).

In moist, alkaline soils.

Bouteloua racemosa Lag.

North Dakota: Minot (Brannon 107), Merrifield, Dickinson, Jamestown, Oakes.

South Dakota: Brookings (Wilcox 3, 4), Redfield (Griffiths 67), Aberdeen (Griffiths 83, 134), Frankfort (Griffiths 61), Huron (Griffiths 18), Firesteel Creek (Wilcox), Medicine Horse Creek (Wallace 10), Indian Creek (Wallace 9).

Dry prairies and hillsides.

Bouteloua hirsuta Lag.

South Dakota: Brookings, Sioux Falls, Iroquois, Aurora County (Wilcox 41).

Dry soil of rocky knolls.

Bouteloua oligostachya Torr.

North Dakota: Minot (Brannon 104), Dickinson (Brannon 133), Devil's Lake, Church's Ferry, Bottineau, Jamestown, Grand Forks, Oakes, Bismarck.

South Dakota: Brookings (Wilcox 1, 2), Aberdeen (Griffiths 137), Pierre (Griffiths 26), Huron, Sioux Falls, Salem, White River (Wallace 20, 47), Aurora County (Wilcox).

Bulbilis dactyloides (Nutt.) Rafin.

North Dakota: More or less abundant along the Northern Pacific Railroad west of Jamestown.

South Dakota: Aberdeen (Griffiths 122), Redfield (Griffiths 66), Huron (Griffiths 11), Highmore (Griffiths 46), Firesteel Creek (Wilcox), Medicine Root Creek (Wallace 11), White River (Wallace 48), Aurora County (Wilcox 43), Iroquois (Wilcox 42).

Dry prairies.

FESTUCACEÆ.**Munroa squarrosa** Torr.

South Dakota: Pierre (Griffiths 24), Little White River (Wallace 8), Cheyenne River (Wallace 7).

Dry, sandy soil.

Phragmites vulgaris Trin.

North Dakota: Church's Ferry (Brannon 60), Minnewaukon, Minot, Sweet Briar.

South Dakota: Brookings, Redfield (Griffiths 73), Canning (Griffiths 105), Aurora County (Wilcox).

Wet, sandy soil, along margins of streams and lakes.

Leptochloa fascicularis Gray.

South Dakota: Brookings, Aberdeen (Griffiths 111), Aurora County, along Firesteel Creek (Wilcox 7).

Margins of brackish pools.

Eragrostis major Host.

South Dakota: Brookings, Aberdeen (Griffiths 117), Pierre (Griffiths 23, 37), Sioux Falls, White River (Wallace 22).

Fields and waste places.

Eragrostis pectinacea spectabilis (Pursh) Gray.

Iowa: Waupsaipinicon River (Wilcox 29).

Eragrostis purshii Schrad.

South Dakota: Brookings, Huron, Plankinton (Wilcox 9).

Fields and waste places.

Eragrostis reptans Nees.

South Dakota: Brookings, Aurora County (Wilcox 46), Aberdeen (Griffiths 140), Huron.

Banks of streams and dried-up ponds. The Aurora County specimens are more or less pubescent and have the spikelets in capitate cluster. They apparently belong to the var. *capitata* of Nuttall.

Eatonia nitida (Sprengl.) Nash. (*E. dudleyi* Vasey).

North Dakota: Grand Forks (Brannon 11).

Eatonia obtusata Gray.

North Dakota: Dunseith (Brannon 95).

South Dakota: Brookings (Wilcox 60), Aurora County (Wilcox), Rosebud (Wallace 25), White River (Wallace 58), Indian Creek (Wallace 59), Sioux Falls.

Rather dry bottom lands.

Eatonia pennsylvanica Gray.

North Dakota: Pleasant Lake (Brannon 75).

South Dakota: Brookings, Sioux Falls.

Open woods.

Koeleria cristata Pers.

North Dakota: Grand Forks (Brannon 14), Devil's Lake, Langdon, Bottineau, Church's Ferry, Minot, Dickinson, Oakes, Jamestown, Fargo.

South Dakota: Brookings (Wilcox 37), Plana (Griffiths 131), Huron (Griffiths 1), buttes along the Keya Paha (Wallace 26), Rosebud (Wallace 27), White Clay buttes (Wallace 60), Sioux Falls, Salem, Iroquois, Aurora County (Wilcox 39).
Dry prairies.

Catabrosa aquatica Beauv.

South Dakota: White River (Wallace 23).
Wet, marshy ground.

Melica hallii Vasey.

North Dakota: Langdon (Brannon 45), Dunseith (Brannon 100).
In dry soil of high, rolling prairies.

Distichlis spicata stricta Thurb.

North Dakota: Church's Ferry (Brannon 62), Grand Forks, Bad Lands west of the Missouri River.

South Dakota: Brookings, Rondell (Griffiths 128), Aberdeen (Griffiths 112), Iroquois, Huron, Aurora County (Wilcox 36), White River (Wallace 6), Bad Lands along Cheyenne River (Wallace 57).
Saline soil.

Dactylis glomerata Linn.

North Dakota: Red River Valley.
South Dakota: Brookings, Sioux Falls.
Cultivated, and occasionally escaped.

Poa arida Vasey.

North Dakota: Merrifield (Brannon 19), Oakes.
South Dakota: Brookings, Aurora County (Wilcox 32), Huron, Iroquois.
Moist ground.

Poa buckleyana Nash.

North Dakota: Merrifield (Brannon 24), Dickinson (Brannon 120), Devil's Lake, Church's Ferry.
South Dakota: Bad Lands along White River (Wallace).
In dry soil of prairies and tops of buttes, forming dense bunches.

Poa compressa Linn.

South Dakota: Brookings, Highmore (Griffiths 47), James River Valley, Iroquois, Chamberlain, Brown County.
Dry soil, cultivated, and some forms apparently indigenous.

Poa nemoralis Linn.

North Dakota: Langdon (Brannon 39), Conway (Brannon 33), Dickinson (Brannon 126).
South Dakota: Big Stone, Lake Hendricks, Brookings, Sioux Falls, Canning, Battle Creek (Wallace 19), Sand Lake.
In dry soil. Nos. 33 and 126 of Professor Brannon's collection belong to the form known as *Poa caesia strictior* Gray.

Poa nevadensis Vasey.

North Dakota: Grand Forks (Brannon 16).
In low but rather dry meadows.

Poa pratensis Linn.

North Dakota: Grand Forks (Brannon 2, 17, 42), Langdon (Brannon 43), Inkster, Oakes, Fargo, Church's Ferry.
South Dakota: Big Stone, Brookings, Sioux Falls, Aurora County, Huron, Aberdeen.
Cultivated, and also occurring wild in moist prairie meadows.

Poa flava L. (*Poa serotina* Ehrh.)

North Dakota: Grand Forks (Brannon 13), Inkster (Brannon 32), Minnewaukon (Brannon 67), Church's Ferry (Brannon 73), Willow City (Brannon 83).

South Dakota: Brookings, Sioux Falls, Blunt, Lake Hendricks, Aberdeen (Griffiths 114).

In both dry and moist soils. The specimens from Minnewaukon grew in a dry alkaline meadow.

Glyceria airoides (Nutt.) Gray.

North Dakota: Minnewaukon (Brannon 71), Medora (Brannon 136), Grand Forks, Inkster, Mandan.

South Dakota: throughout the Bad Lands region.

In moist, alkaline soils.

Glyceria aquatica J. E. Smith.

North Dakota: Monroe (Brannon 110), Grand Forks.

South Dakota: Brookings, Aurora County, Frankfort (Griffiths 50), Medicine Horse Creek (Wallace 29).

Shallow water.

Glyceria fluitans R. Br.

South Dakota: Brookings (Wilcox 66), and elsewhere in the Sioux Valley.

In shallow water.

Glyceria nervata Trin.

South Dakota: Brookings (Wilcox 18), Sioux Falls, Aurora County, White River (Wallace 62), Bear Creek (Wallace 21).

In wet, boggy meadows or shallow water.

Scolochloa arundinacea (Lilj.) MacM.

North Dakota: Webster's Chapel (Brannon 57).

South Dakota: Brookings.

Shallow water, apparently quite local in distribution.

Festuca elatior Linn.

South Dakota: Brookings, Mellette (Griffiths 145).

Cultivated, and escaping here and there along roadsides.

Festuca elatior pratensis Gray.

South Dakota: Brookings, Mellette (Griffiths 146).

Cultivated, and occasionally escaping.

Festuca octoflora Walt.

North Dakota: A few specimens mixed with a miscellaneous lot of material collected at Langdon and Inkster.

South Dakota: Brookings, Sioux Falls, Aurora County (Wilcox 65).

Dry soil on rocky hills.

Bromus ciliatus Linn.

North Dakota: Bottineau (Brannon 84, 92), Grand Forks, Girard Lake.

South Dakota: Big Stone, Brookings, Sioux Falls, Iroquois, Aurora County, Redfield (Griffiths 74).

In dry soil of open woods.

Bromus inermis Leyss.

South Dakota: Brookings, Mellette (Griffiths 143), Aurora County (Wilcox), Beadle County.

Cultivated, and spreading into roadsides and fields.

Bromus kalmii Gray.

North Dakota: Bottineau (Brannon 79, 87).
In open woods.

HORDEÆ.

Agropyron caninum R. & S.

South Dakota: Brookings (Wilcox 22), Iroquois, Huron.
Dry fields and roadsides.

Agropyron divergens Nees.

North Dakota: Dickinson (Brannon 123).
South Dakota: Bad Lands along Indian Creek (Williams and Wilcox, August, 1891).
Dry hillsides and tops of buttes.

Agropyron pseudorepens Scribn. & Smith. Bull. 4, Div. Agros., p. 34 (1897).

North Dakota: Medora (Brannon 127), Grand Forks, Inkster, Oakes.
South Dakota: Brookings, Frankfort (Griffiths 55), Huron, Pierre (Griffiths 106),
Cheyenne River (Wallace 55).
In rich but rather dry soil.

Agropyron richardsoni Schrad. (*A. unilaterale* Cass.)

North Dakota: Dickinson (Brannon 131), Willow City, Oakes.
South Dakota: Brookings (Wilcox 72), Le Beau, Chamberlain.
Dry prairie soil.

Agropyron spicatum (Pursh) Scribn. & Smith, Bull. 4, Div. Agros., p. 33. (*Agropyrum repens* var. *glaucum* of the manuals.)

North Dakota: Willow City (Brannon 78), Church's Ferry, Inkster, Edinburg, Devil's Lake, Oakes, Fargo.
South Dakota: Brookings, Huron (Griffiths 17), Aberdeen (Griffiths 81), St. Lawrence (Griffiths 41), Sioux Falls, Salem, Aurora County (Wilcox 19), White River (Wallace 44, 51, 52).
In dry soil of prairies, roadsides, and neglected fields.

Agropyron tenerum Vasey.

North Dakota: Dickinson (Brannon 128), Church's Ferry, Oakes.
South Dakota: Brookings (Wilcox 45), Huron (Griffiths 5, 16), Frankfort (Griffiths 62), Redfield (Griffiths 69), Aurora County, Canning, White River (Wallace 53), Chamberlain, Bangor, Indian Creek.
Dry bottom lands, along roadsides, and in neglected fields.

Hordeum jubatum L.

North Dakota: Dickinson (Brannon 117), Oakes, Fargo, Jamestown, Mandan.
South Dakota: Brookings, Sioux Falls, Salem, Aurora County (Wilcox), Huron (Griffiths 13), Aberdeen (Griffiths 85), White River (Wallace 54).
Waste places in fields, along irrigating ditches, and in meadows. Abundant throughout the Northwest.

Hordeum nodosum L.

South Dakota: Sioux Falls.
Margins of desiccated ponds, particularly where the soil is somewhat alkaline.

Elymus canadensis L.

North Dakota: Minnewaukon (Brannon 66), Devil's Lake, Minot, Grand Forks, Dickinson, Oakes, Fargo.
South Dakota: Brookings (Wilcox 63), Sioux Falls, Redfield (Griffiths 75), Frankfort (Griffiths 64), Pierre (Griffiths 27, 33), Aurora County (Wilcox 24), White River (Wallace 16), Indian Creek (Wallace 17).
In rather dry soil of open woods, meadows, and neglected tree claims.

Elymus macounii Vasey.

North Dakota: Minot (Brannon 106), Grand Forks.

South Dakota: Brookings, Big Stone, Frankfort (Griffiths 63); Huron (Griffiths 4).
Dry bottom lands and neglected tree claims.

Elymus robustus Scribn. & Smith, Bull. 4, Div. Agros., p. 37 (1897).

South Dakota: Mellette (Griffiths 139).

Elymus striatus Willd.

South Dakota: Brookings (Wilcox 68).

Open woodlands.

Elymus virginicus L.

North Dakota: Minot (Brannon 114), Bottineau, Oakes.

South Dakota: Brookings (Wilcox 5), Sioux Falls, Redfield (Griffiths 76), Aurora County, White River (Wallace 45), Indian Creek (Wallace 18).

Elymus sp.

North Dakota: Bottineau (Brannon 85).

Dry soil along the edges of thickets. "The heads bend downward shortly after the flowering season" (Brannon).

TYPHACEÆ.**Typha latifolia** L.

South Dakota: Aberdeen (Griffiths 126).

Becoming very abundant in the water from the artesian wells.

CYPERACEÆ.**Cyperus acuminatus** Torr. & Hook.

South Dakota: Frankfort (Griffiths 57).

Dry ditches.

Cyperus erythrorhizos Muhl.

South Dakota: Brookings, Sioux Falls, Iroquois, Tacoma Park on the James River (Griffiths 97).

Cyperus schweinitzii Torr.

North Dakota: Rugby Junction (Brannon 97).

South Dakota: Rock Ridge Creek (Wallace 74), Rosebud (Wallace 75), Medicine Root Creek (Wallace 76).

In dry sandy soil.

Cyperus speciosus Vahl.

South Dakota: Huron (Griffiths 9).

Moist, shady places.

Eleocharis acicularis R. & S.

North Dakota: Pleasant Lake (Brannon 74).

South Dakota: Brookings, Dell Rapids, Brady Creek (Wallace 73).

Growing in dense mats along the banks of ponds or streams.

Eleocharis acuminata (Muhl.) Nees.

North Dakota: Conway (Brannon 35).

South Dakota: Brookings.

Wet, boggy soil.

Eleocharis palustris L.

North Dakota: Girard Lake (Brannon 103).

South Dakota: Brookings, Sioux Falls, Big Stone.

In low, wet ground or shallow water.

Scirpus americanus Pers. (*S. pungens* Vahl.)

South Dakota: Brookings, Redfield (Griffiths 80), Aberdeen (Griffiths 115a, b, c), Rosebud (Wallace 71).

Moist soil and margins of lakes, ponds, and along irrigating ditches. Mr. Griffiths' specimens from Aberdeen show the variation of the species under different conditions of soil moisture. No. 115c, which grew in the water of an irrigating ditch, seems to be variety *longispicatus* Britt., but the plants are immature.

Scirpus atrovirens Muhl.

South Dakota: Brookings, Sioux Falls, Iroquois, Rock Ridge Creek (Wallace 69). Wet, boggy land.

Scirpus atrovirens pallidus Britt.

North Dakota: Grand Forks (Brannon 31).

South Dakota: Bear Creek (Wallace 72).

Wet, boggy land.

Scirpus fluviatilis Gray.

North Dakota: Grand Forks (Brannon 25).

South Dakota: Brookings, Sioux Falls, Aurora County (Wilcox), Aberdeen (Griffiths 119), Redfield (Griffiths 72), Huron (Griffiths 2).

Shallow water. Very common along the borders of lakes throughout the Northwest and spreading very rapidly along irrigating ditches and about reservoirs.

Scirpus lacustris L.

North Dakota: Grand Forks (Brannon 15), Dunseith (Brannon 94), Devil's Lake, Fargo, Oakes, Jamestown.

South Dakota: Big Stone, Lake Hendricks, Brookings, Sioux Falls, Running Water, Blunt, Aberdeen (Griffiths 102, 110), Aurora County (Wilcox), Rosebud (Wallace, 70).

In shallow water of sloughs and along lake shores.

Scirpus robustus Pursh.

North Dakota: Minnewaukon (Brannon 69), Grand Forks.

South Dakota: Brookings, Iroquois, Aberdeen (Griffiths 109), Miller (Griffiths 44), Aurora County (Wilcox).

In brackish water of shallow lakes and along irrigating ditches.

Rhynchospora capillacea Torr.

North Dakota: Bottineau (Brannon 89).

In dense mats on boggy ground.

Carex aristata R. Br.

North Dakota: Girard Lake (Brannon 102a).

South Dakota: Brookings, Tacoma Park (Griffiths 99), Plana (Griffiths 84), Aberdeen (Griffiths 93).

Wet, boggy land.

Carex assinniboienensis W. Boott (†).

South Dakota: Oakwood Lakes (Griffiths 88).

Woodlands.

Carex festucacea Willd.

North Dakota: Minot (Brannon 116a), Oakes.

South Dakota: Brookings.

Sloughs.

Carex filifolia Nutt.

South Dakota: Top of Sheep Mountain in the Bad Lands near Cheyenne River (Wallace 75).

Carex flava L.

North Dakota: Bottineau (Brannon 90).
In boggy ground.

Carex haydeni Dewey.

South Dakota: Tacoma Park (Griffiths 99b).
Sloughs.

Carex lanuginosa Michx.

North Dakota: Girard Lake (Brannon 102b), Oakes.
South Dakota: Brookings, Iroquois, Aurora County.
Moist, boggy land.

Carex laxiflora blanda (Dewey) Beott.

South Dakota: Oakwood Lakes (Griffiths 87).
Open woods.

Carex meadii Dewey.

North Dakota: Langdon (Brannon 37), Oakes.
South Dakota: Brookings.
Moist soil.

Carex pennsylvanica Lam. (f).

North Dakota: Grand Forks (Brannon 29).
Dry soil. Specimens immature.

Carex retrorsa Schwein.

South Dakota: Brookings, Flandreau, Aurora County.
Wet, boggy meadows.

Carex sartwellii Dewey.

North Dakota: Grand Forks (Brannon 8, 27, 70).
In sloughs and moist meadows. Nos. 8 and 27 are staminate and immature.

Carex siccata Dewey.

South Dakota: Brookings, Aurora County (Wilcox).
Rather dry meadows.

Carex stipata Muhl.

South Dakota: Rosebud (Wallace 75).

Carex stricta Lam.

North Dakota: Grand Forks (Brannon 9), Oakes.
South Dakota: Brookings, Sioux Falls, Aurora County (Wilcox).
Wet, boggy meadows.

Carex stricta angustata Bailey.

North Dakota: Girard Lake (Brannon 102c).
South Dakota: Brookings.
Low, damp ground.

Carex tenera Dewey.

North Dakota: Minot (Brannon 116b).
South Dakota: Brookings.
Sloughs.

Carex vulpinoidea Michx.

South Dakota: Brookings, Chamberlain, White River (Wallace 74).
Meadows.

Carex xerantica Bailey.

North Dakota: Devil's Lake (Brannon 52).

South Dakota: Tacoma Park (Griffiths 98).

Rather dry soil.

JUNCACEÆ.**Juncus balticus** Willd.

North Dakota: Dunseith (Brannon 93), Knox, Grand Forks.

South Dakota: Brookings.

In wet bottom lands.

Juncus bufonius L.

South Dakota: White River (Wallace 65).

Wet, boggy places.

Juncus nodosus L.

North Dakota: Dickinson (Brannon 121).

South Dakota: Brookings, Iroquois, Sioux Falls.

Low ground.

Juncus tenuis Willd.

North Dakota: Minot (Brannon 109).

South Dakota: Brookings, head of White Willow Creek (Wallace 67), Rosebud (Wallace 68).

In low, moist ground.

Juncus torreyi Coville.

North Dakota: Minnewaukon (Brannon 68), Devil's Lake (Brannon 51).

South Dakota: Brookings, Iroquois, Medicine Root Creek (Wallace 66).

Wet meadows.

IRIDACEÆ.**Sisyrinchium angustifolium** Mill.

North Dakota: Grand Forks (Brannon 3), Langdon, Devil's Lake.

South Dakota: Brookings, Aurora County (Wilcox), Aberdeen (Griffiths 101), Sioux Falls.

POLYGONACEÆ.**Polygonum aviculare** L.

North Dakota: Oakes, Fargo, Jamestown.

South Dakota: Brookings, Sioux Falls, Huron, Aberdeen, Aurora County (Wilcox).

Dry soil in waste places and roadsides. Common everywhere in the Northwest.

Polygonum erectum L.

South Dakota: Brookings, Sioux Falls, Aurora County (Wilcox).

Fields and waste places.

Polygonum littorale Link.

South Dakota: Brookings.

Old fields and roadsides.

CHENOPODIACEÆ.**Chenopodium album** L.

North Dakota: Oakes, Jamestown, Fargo.

South Dakota: Brookings, Huron, Iroquois, Sioux Falls, Aberdeen, Aurora County (Wilcox).

Fields and waste places. Abundant throughout.

Chenopodium leptophyllum (Moq.) Nutt.

South Dakota: Brookings, Huron, Iroquois, Aurora County (Wilcox 73).

Atriplex argenteum Nutt.

South Dakota: Pierre, Aurora County (Wilcox), White River.
In "gumbo" soil.

Atriplex hastatum L.

South Dakota: Brookings, Sioux Falls, Iroquois, Aberdeen, Aurora County (Wilcox).
Waste places in saline soils, "gumbo flats," etc.

Eurotia lanata Moq.

Dry "alkali" soil in central and western South Dakota.

Salsola tragus L.

More or less abundant in both the Dakotas.

LEGUMINOSÆ.**Medicago sativa** L.

Frequently seen in cultivation in both States.

Melilotus alba Lam.

North Dakota: Southern slope of the Turtle Mountains (Brannon).
South Dakota: Brookings, Mellette (Griffiths 155), Sioux Falls, Brown County.
Cultivated, and also escaped to roadsides, railroad embankments, and waste places.

Melilotus officinalis Willd.

North Dakota: Turtle Mountains (Brannon), Fargo.
South Dakota: Brookings, Sioux Falls.
Cultivated, and occasionally escaped to waste places, etc.

Lupinus luteus L.

South Dakota: Brookings, Mellette (Griffiths 149).
Cultivated; thriving in sandy soil.

Trifolium beckwithii Brewer.

South Dakota: Brookings.
Moist meadows.

Trifolium hybridum L.

North Dakota: Grand Forks (Brannon 21), Church's Ferry, Hillsboro, Fargo.
South Dakota: Brookings, Aberdeen, Mellette (Griffiths 150), Sioux Falls, Aurora County.
Cultivated, and escaped to roadsides and meadows.

Trifolium pratense L.

North Dakota: Church's Ferry (Brannon 58), Grand Forks, Devil's Lake, Fargo, Jamestown.
South Dakota: Brookings, Millbank, Sioux Falls, Watertown, Aberdeen, Mellette (Griffiths 151, 152), Plankinton (Wilcox), Huron, Miner County.
Cultivated, and escaped to moist meadows, roadsides, and ditches.

Trifolium repens L.

North Dakota: Oakes, Fargo, Jamestown.
South Dakota: Brookings, Millbank, Sioux Falls, Salem, Huron, Aberdeen, Aurora County, Watertown, Miner County.
Cultivated in pastures and dooryards, and escaped to roadsides and waste places.

Hosackia purshiana Benth.

North Dakota: Medora (Brannon 124), Dickinson, Minot, Fort Totten, Langdon, Grand Forks, Oakes, Jamestown, Mandan.
South Dakota: Brookings, Aberdeen (Griffiths 92), Pierre, Chamberlain, Huron, Aurora County (Wilcox), Redfield.

Sandy soil, abundant in the valleys of the James and Missouri rivers, and more or less common throughout both States.

***Psoralea argophylla* Pursh.**

Prairies throughout the Northwest.

***Psoralea esculenta* Pursh.**

Sandy or gravelly soil throughout.

***Dalea alopecuroides* Willd.**

South Dakota: Aurora County (Wilcox).

Sandy soil. Abundant in the lower Missouri Valley.

***Astragalus adsurgens* Pall.**

North Dakota: Bottineau (Brannon 86), Oakes.

South Dakota: Brookings, Aberdeen, Huron, Salem, Iroquois, Aurora County (Wilcox 83).

In dry soil on high prairies.

***Astragalus bisulcatus* Gray.**

North Dakota: Manvel (Brannon 1), Grand Forks.

South Dakota: Bad Lands between the White and Cheyenne rivers.

***Astragalus canadensis* L.**

South Dakota: Brookings (Wilcox 81), Iroquois, Sioux Falls, Aurora County (Wilcox).

***Astragalus caryocarpus* Ker.**

North Dakota: Minot (Brannon 105), Dickinson, Grand Forks, Oakes.

South Dakota: Brookings (Wilcox 79), Watertown, Sioux Falls, Aberdeen, Huron, Aurora County (Wilcox).

Dry soil on rolling prairies.

***Astragalus flexuosus* Dougl.**

North Dakota: Grand Forks (Brannon 6), Devil's Lake.

South Dakota: Brookings, Aurora County (Wilcox), McPherson County, Iroquois, Lake Hendricks (Wilcox 80).

Dry prairies.

***Astragalus hypoglottis* L.**

North Dakota: Grand Forks (Brannon 7), Inkster, Oakes, Jamestown.

South Dakota: Brookings (Wilcox 82), Salem, Huron, Watertown, Aberdeen, Aurora County (Wilcox).

Dry prairies and banks of coulees.

***Astragalus missouriensis* Nutt.**

South Dakota: Aurora County (Wilcox 77).

Prairies.

***Astragalus plattensis* Nutt.**

South Dakota: Aurora County (Wilcox), Salem (Wilcox 78).

Sandy soil.

***Oxytropis lambertii* Pursh.**

North Dakota: Inkster (Brannon 36), Langdon, Devil's Lake, Grand Forks, Oakes, Jamestown.

South Dakota: Brookings, Sioux Falls, Iroquois, Watertown, Aberdeen, Redfield, Aurora County (Wilcox).

Dry soil on high prairies.

***Desmodium canadense* D. C.**

North Dakota: Fort Totten (Brannon 53), Edinburg, Grafton.

South Dakota: Brookings, Sioux Falls, Iroquois.

Rich soil on the borders of woods, etc.

***Vicia americana* Muhl.**

North Dakota: Inkster (Brannon 5), Grand Forks (Brannon 47), Manvel.

South Dakota: Brookings (Wilcox 85), Sioux Falls, Iroquois, Aurora County (Wilcox).

Moist meadows and thickets.

***Vicia americana linearis* Watson.**

North Dakota: Manvel (Brannon 22).

South Dakota: Brookings, Iroquois, Watertown, Salem, Big Stone.

Dry fields and meadows.

***Vicia villosa* Roth.**

South Dakota: Brookings, Mellette (Griffiths 154).

Cultivated, and rarely as an escape.

***Vigna catjang* Walp.**

South Dakota: Brookings, Mellette (Griffiths 153).

Cultivated.

***Lathyrus palustris* L.**

North Dakota: Merrifield (Brannon 20), Grand Forks, Inkster.

South Dakota: Brookings, Sioux Falls, Iroquois.

Moist meadows, banks, and ditches.

***Lathyrus venosus* Muhl.**

North Dakota: Union (Brannon 44), Edinburg.

South Dakota: Brookings, Lake Hendricks.

In rich soil of meadows and thickets, climbing to a height of 4 to 8 feet, and producing a dense tangled growth.

